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CHAPTER II

Preliminary Classification:
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TRANSMITTAL LETTER
TO THE UNITED STATES ELECTED OFFICE (EO/US)
(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)

PCT/US99/13091	10 June 1999 (10.06.99)	10 June 1999 (10.06.99)
International Application Number	**International Filing Date**	**International Earliest Priority Date**

TITLE OF INVENTION: CLOSURE DEVICE AND METHOD OF ASSEMBLY

APPLICANT(S): SAVICKI, Alan. F; John C. Ware

Box PCT
Assistant Commissioner for Patents
Washington D.C. 20231
ATTENTION: EO/US

1. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. Section 371:

 a. This express request to immediately begin national examination procedures (35 U.S.C. Section 371(f)).

 b. The U.S. National Fee (35 U.S.C. Section 371(c)(1)) and other fees (37 C.F.R. Section 1.492) as indicated below:

2. Fees

CLAIMS FEE*	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALC-ULATIONS
	TOTAL CLAIMS	117 -20 =	97	x $18.00 =	$1,746.00
	INDEPEN-DENT CLAIMS	5 - 3 =	2	x $84.00 =	$168.00
	MULTIPLE DEPENDENT CLAIM(S) (if applicable) + $270.00				$0.00
BASIC FEE	U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in Section 1.482 has been paid on the international application to the U.S. PTO: and the above requirements are not met (37 C.F.R. Section 1.492(a)(1)) $690.00				$740.00
	Total of above Calculations				=$2,654.00
SMALL ENTITY	Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed. (note 37 CFR Sections 1.9, 1.27, 1.28)				- $0.00
	Subtotal				$2,654.00
	Total National Fee				$2.654.00
	Fee for recording the enclosed assignment document $40.00 (37 C.F.R. Section 1.21(h)). See attached "ASSIGNMENT COVER SHEET".				$40.00
TOTAL	Total Fees enclosed				$2,694.00

Please charge Account No. 03-2270 in the amount of $2,694.00.

A duplicate copy of this sheet is enclosed.

3. A copy of the International application as filed (35 U.S.C. Section 371(c)(2)) is enclosed. The application was filed with the United States Receiving Office.

4. A translation of the International application into the English language (35 U.S.C. Section 371(c)(2)) is not required as the application was filed in English.

5. Amendments to the claims of the International application under PCT Article 19 (35 U.S.C. Section 371(c)(3)) have not been transmitted. Applicant chose not to make amendments under PCT Article 19.

Date of mailing of Search Report (from form PCT/ISA/210): 14 October 1999.

6. A translation of the amendments to the claims under PCT Article 19 (38 U.S.C. Section 371(c)(3)) has not been transmitted for reasons indicated in section 5.

7. A copy of the international examination report (PCT/IPEA/409) is not required as the application was filed with the United States Receiving Office.

8. Annex(es) to the international preliminary examination report is/are not required as the application was filed with the United Stated Receiving Office.

9. A translation of the annexes to the international preliminary examination report is not required as the annexes are in the English language.

10. An oath or declaration of the inventor (35 U.S.C. Section 371(c)(4)) complying with 35 U.S.C. Section 115 is submitted herewith, and such oath or declaration is attached to the application.

11. An Information Disclosure Statement under 37 C.F.R. Sections 1.97 and 1.98 is transmitted herewith.

Also transmitted herewith are Form PTO-1449 (PTO/SB/08A and 08B) and copies of citations listed, along with a copy of the International Search Report.

12. An assignment document is transmitted herewith for recording.

13. Additional documents:

a. Copy of request (PCT/RO/101)

14. .The above items are being transmitted before 30 months from.any claimed priority date.

Date: November 15, 2001

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CLOSURE DEVICE AND METHOD OF ASSEMBLY

FIELD OF THE INVENTION

The present invention relates generally to closure devices and, more particularly, to a slider, interlocking fastening strips, and a method of assembly. The inventive closure device and method may be employed in traditional fastener areas, and is particularly well suited for fastening flexible storage containers, including plastic bags.

BACKGROUND OF THE INVENTION

The use of closure devices for fastening storage containers, including plastic bags, is generally well known. Furthermore, the manufacture of closure devices made of plastic materials is generally known to those skilled in the art, as demonstrated by the numerous patents in this area.

A particularly well-known use for closure devices is in connection with flexible storage containers, such as plastic bags. In some instances, the closure device and the associated container are formed from thermoplastic materials, and the closure device and the side walls of the container are integrally formed by extrusion as a single piece. Alternatively, the closure device and side

walls of the container may be formed as separate pieces and then connected by heat sealing or any other suitable connecting process. In either event, such closure devices are particularly useful in providing a closure means for retaining matter within the bag.

Conventional closure devices typically utilize mating fastening strips or closure elements which are used to selectively seal the bag. With such closure devices, however, it is often difficult to determine whether the fastening strips are fully occluded. This problem is particularly acute when the strips are relatively narrow. Accordingly, when such fastening strips are employed, there exists a reasonable likelihood that the closure device is at least partially open.

Such fastening strips are also particularly difficult to handle by individuals with limited manual dexterity. Thus, in order to assist these individuals and for ease of use by individuals with normal dexterity, the prior art has also provided sliders for use in opening and closing the fastening strips, as disclosed, for example, in U.S. Patent Nos. 4,199,845, 5,007,142, 5,007,143, 5,010,627, 5,020,194, 5,070,583, 5,283,932, 5,301,394, 5,426,830, 5,431,760, 5,442,838, and 5,448,808.

During assembly of closure devices utilizing sliders, the sliders are often mounted onto fastening strips by moving the slider over the fastening strips in the vertical Z axis. Specifically, if the longitudinal axis of the fastening strips and slider is the X axis, the width is the transverse Y axis and the height is the vertical Z axis, the slider is attached to the fastening strips by moving the slider over the fastening strips in the vertical Z axis. In the past, sliders attached in the vertical Z axis have utilized folding design with the hinge along the X axis such as the sliders in U.S. Patents 5,010,627, 5,067,208, 5,070,583, and 5,448,808.

Other sliders have used multiple parts which are assembled together such as the sliders in U.S. Patent Nos. 5,007,142, 5,283,932 and 5,426,830.

Another method of installing a slider is shown in U.S. Patent 5,431,760.

It would be desirable to have a continuous process for attaching a slider to the end of the fastening strips in the horizontal X axis. Such a device would reduce the manufacturing costs of closure devices utilizing sliders in addition to providing an effective and reliable means of attaching sliders to the fastening strips.

OBJECTS OF THE INVENTION

Accordingly, a general object of the present invention is to provide a slider which overcomes the deficiencies of the prior art.

A more specific object of the present invention is to provide a slider that may be attached to fastening strips in the horizontal X axis.

A further object of the present invention is to provide a slider that may be attached to the end of the fastening strips in the horizontal X axis.

Another object of the present invention is to provide a slider that once attached prevents itself from being removed from fastening strips thereafter.

SUMMARY OF THE INVENTION

The inventive closure device is intended for use with a storage container which includes a pair of complementary sheets or opposing flexible side walls, such as a plastic bag. The closure device includes interlocking fastening strips disposed along respective edge portions of the opposing side walls, and a slider slidably disposed on the interlocking fastening strips for facilitating the occlusion and deocclusion of the fastening strips when moved towards first and second ends thereof. In

accordance with the present invention, a method is provided for facilitating the attachment of the slider onto the fastening strips in the horizontal X axis. In addition, the slider and fastening strips engage to prevent removal of the slider from the fastening strips in the horizontal X axis. Additionally, the slider includes offsets which provide resistance against the removal of the slider from the fastening strips in the vertical Z axis.

These and other objects, features, and advantages of the present invention will become more readily apparent upon reading the following detailed description of exemplified embodiments and upon reference to the accompanying drawings herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a container according to the present invention in the form of a plastic bag;

Fig. 2 is a top view of the container in Fig. 1;

Fig. 3 is a partial cross-sectional view of the fastening strips taken along line 3-3 in Fig. 2;

Fig. 4 is another embodiment of attaching the fastening strips to the side walls of the container;

Fig. 5 is a top view of the slider in Fig. 2;

Fig. 6 is a bottom view of the slider in Fig. 2;

Fig. 7 is a front view of the slider in Fig. 2;

Fig. 8 is a rear view of the slider in Fig. 2;

Fig. 9 is a right side view of the slider in Fig. 2;

Fig. 10 is a cross-sectional view taken along line 10-10 in Fig. 2;

Fig. 11 is a cross-sectional view taken along line 11-11 in Fig. 2;

Fig. 12 is a cross-sectional view taken along line 12-12 in Fig. 2;

Fig. 13 is a right side view of the slider in Fig 2 and a fragmentary side view of the container in Fig. 2;

Fig. 14 is a top view of the slider and the fastening strips and illustrates their respective positions to one another as the fastening strips are positioned onto the slider;

Fig. 15 is a top view of the slider and the fastening strips and illustrates their respective positions to one another as the fastening strips are positioned onto the slider;

Fig. 16 is a top view of the slider and the fastening strips and illustrates their respective positions to one another as the fastening strips are positioned onto the slider;

Fig. 16A is a cross-sectional view taken along line 16A-16A in Fig. 16;

Fig. 17 is a top view of the slider and the fastening strips and illustrates their respective positions to one another as the fastening strips are positioned onto the slider;

Fig. 17A is a cross-sectional view taken along line 17A-17A in Fig. 17;

Fig. 18 is a top view of the slider and the fastening strips and illustrates their respective positions to one another as the fastening strips are positioned onto the slider;

Fig. 18A is a cross-sectional view taken along line 18A-18A in Fig. 18;

Fig. 19 is a perspective view of a system used to attach sliders onto containers in the horizontal X axis;

Fig. 20 is a side view of another embodiment of a system used to attach sliders onto containers in the horizontal X axis;

Fig. 21 is a top view of the system in Fig. 20;

Fig. 22 is a side view of another embodiment of the slider and a side view of another embodiment of the fastening strips;

Fig. 23 is a top view of the slider and fastening strips in Fig. 22;

Fig. 24 is an enlarged partial cross-sectional view taken along line 24-24 in Fig. 22;

Fig. 25 is a side view of the slider engaged with an end stop of the fastening strips in Fig. 22;

Fig. 26 is a top view of the slider engaged with the end stop of the fastening strips in Fig. 22;

Fig. 27 is a top view of the slider and another embodiment of the fastening strips;

Fig. 28 is a rear view of another embodiment of the slider and a cross-sectional view of another embodiment of the fastening strips; and

Fig. 29 is a rear view of another embodiment of the slider and a cross-sectional view of another embodiment of the fastening strips.

While the present invention will be described and disclosed in connection with certain embodiments and procedures, the intent is not to limit the present invention to these embodiments and procedures. On the contrary, the intent is to cover all such alternatives, modifications, and equivalents that fall within the spirit and scope of the present invention as defined by the appended claims.

DESCRIPTION OF THE EMBODIMENTS

Figs. 1 and 2 illustrate a container in the form of a plastic bag 120 having a sealable closure device 121. The bag 120 includes side walls 122, 123 joined at seams 125, 126 to form a compartment sealable by means of the closure

device 121. The closure device 121 comprises first and second fastening strips 130, 131 and a slider 132.

The fastening strips 130, 131 and the slider 132 have a longitudinal X axis 102 and a transverse Y axis 104 which is perpendicular to the longitudinal X axis 102. Also, the fastening strips 130, 131 have a vertical Z axis 106 which is perpendicular to the longitudinal X axis 102 and which is perpendicular to the transverse Y axis 104.

In use, the slider 132 of the present invention facilitates the occlusion and deocclusion of the interlocking fastening strips 130, 131 when moved in the appropriate direction along the longitudinal X axis 102 of the fastening strips 130, 131. In particular, the slider 132 facilitates the occlusion of the interlocking fastening strips 130, 131 when moved towards a first end 110 thereof, and facilitates the deocclusion of the interlocking fastening strips 130, 131 when moved towards a second end 112 thereof. When the slider 132 is moved in an occlusion direction, as indicated by reference numeral 114 in Figs. 1 and 2, closure of the fastening strips 130, 131 occurs. Conversely, when the slider 132 is moved in a deocclusion direction, as indicated by reference numeral 116, separation of the fastening strips 130, 131 occurs.

In keeping with a general aspect of the present invention and as will be described in greater detail below, the interlocking fastening strips 130, 131 of the present invention may be of virtually any type or form including, for example: (1) U-channel fastening strips as best shown herein at Figs. 3 and 4; (2) "arrowhead-type" fastening strips, as shown herein at Fig. 28; and/or (3) "profile" fastening strips, as disclosed in U.S. Patent No. 5,664,299 and as shown herein at Fig. 29. All of the above-identified patents and applications are hereby incorporated by reference in their entireties.

An illustrative example of the type of closure device that may be used with the present invention is shown in Fig. 3. The fastening strips include a first fastening strip 130 with a first closure element 136 and a second fastening strip 131 with a second closure element 134. The first closure element 136 engages the second closure element 134. The first fastening strip 130 may include an upper flange 163 disposed at the upper end of the first fastening strip 130 and a lower flange 167 and an offset 169, each disposed at the lower end of the first fastening strip 130. The offset 169 is at angle of approximately 60° to the lower flange 167. Likewise, the second fastening strip 131 may include an upper flange 153 disposed at the upper end of the second fastening strip

131 and a lower flange 157 and an offset 159, each disposed at the lower end of the second fastening strip 131. The offset 159 is at angle of approximately 60° to the lower flange 157. The side walls 122, 123 of the plastic bag 120 may be attached to the offsets 159, 169 of their respective fastening strips 130, 131 by conventional manufacturing techniques. As shown in Fig. 4, the side walls 622, 623 of the bag may also be attached to the outside surfaces of their respective fastening strips 630, 631, where the outside surfaces comprise the lower flanges 657, 667 and the base portions 638, 648.

The second closure element 134 includes a base portion 138 having a pair of spaced-apart parallely disposed webs 140, 141, extending from the base portion 138. The webs 140, 141 include hook closure portions 142, 144 extending from the webs 140, 141 respectively, and facing towards each other. The hook closure portions 142, 144 include guide surfaces 146, 147 which serve to guide the hook closure portions 142, 144 for occluding with the hook closure portions 152, 154 of the first closure element 136.

The first closure element 136 includes a base portion 148 including a pair of spaced-apart, parallely disposed webs 150, 151 extending from the base portion 148. The webs 150, 151 include hook closure portions 152, 154

extending from the webs 150, 151 respectively and facing away from each other. The hook closure portions 152, 154 include guide surfaces 145, 155, which generally serve to guide the hook closure portions 152, 154 for occlusion with the hook closure portions 142, 144 of the second closure element 134. The guide surfaces 145, 155 may also have a rounded crown surface. In addition, the hook closure portions 144, 154 may be designed so that the hook closure portions 144, 154 adjacent the interior of the container provide a greater resistance to opening the closure device 121.

The second fastening strip 131 may or may not include a color enhancement member 135 which is described in U.S. Patent 4,829,641 and which is incorporated herein by reference.

Referring to Figs. 5-9, the slider 132 includes a housing 160 having a top portion 170, a first side portion 174, and a second side portion 176. The top portion 170 provides a separator 172 having a first end 190 and a second end 192 where the first end 190 is wider than the second end 192. The separator 172 is triangular in shape as shown in Fig. 6.

The top portion 170 of the slider merges into a first side portion 174 and a second side portion 176. As viewed

in Fig. 7, the first side portion 174 merges into the first front shoulder 240. Likewise, the second side portion 176 merges into the second front shoulder 242. The front shoulders 240, 242 extend inwardly in the transverse Y axis 104 thereby forming a front slot 270 of substantially uniform width as seen in Figs. 5 and 6. The front shoulders 240, 242 provide radial upper surfaces or concave surfaces 246, 248 to maintain proper orientation of the fastening strips 130, 131 within the slider 132.

Similarly, as viewed in Fig. 8, the first side portion 174 merges into the first rear shoulder 260. Also, the second side portion 176 merges into the second rear shoulder 262. The rear shoulders 260, 262 angle inwardly in the transverse Y axis 104 thus forming a rear slot 280 of substantially uniform width. The rear shoulders 260, 262 also provide radial upper surfaces or concave surfaces 266, 268 to maintain proper orientation of the fastening strips 130, 131 within the slider 132.

The first side portion 174 has a first grip 196. Likewise, the second side portion 176 has a second grip 198. The first grip 196 and the second grip 198 extend laterally along the outer surfaces of the side portions 174, 176 and provide inwardly protruding radial gripping surfaces 206, 208 as viewed in Figs. 5 and 6. The radial surfaces 206, 208 are designed to correspond to the

contour of a person's fingertips and facilitate grasping the slider 132 during occlusion or deocclusion of the fastening strips 130, 131.

The slider also provides a flexible occlusion member 210 to force the fastening strips 130, 131 together thus effectuating occlusion of the fastening strips 130, 131 when the slider 132 is moved in the occlusion direction 114. The flexible occlusion member 210 includes a pair of flexible arms 214, 216. The two flexible arms 214, 216 angle inwardly from their respective side portions 174, 176 and project toward the front of the slider 132 as most easily seen in Figs. 5 and 6.

In accordance with a principal aspect of the present invention, a slider 132 is provided for attaching the slider 132 to the fastening strips 130, 131 in the horizontal X axis 102 while preventing the slider 132 from being removed from the fastening strips 130, 131 in the horizontal X axis 102 and in the vertical Z axis 106 thereafter.

Figs. 10-12 illustrate the fastening strips 130, 131 at different locations along the separator 172 of the slider 132. Fig. 10 depicts the fastening strips 130, 131 at a location near the second end 192 (the narrow end) of the separator 172. The separator 172 is located between

the flanges 153, 163 of the fastening strips 130, 131. At this location, the upper webs 140, 150 and the lower webs 141, 151 are occluded. Fig. 11 illustrates the fastening strips 130, 131 at a location along the separator 172. The width of the separator 172 at this location forces the fastening strips 130, 131 apart in the transverse Y axis 104 and the upper webs 140, 150 of the fastening strips 130, 131 are deoccluded. Fig. 12 shows the fastening strips 130, 131 near the first end 190 (the wide end) of the separator 172. At this position, the width of the separator 172 deoccludes both the upper webs 140, 141 and the lower webs 150, 151 of the fastening strips 130, 131. The flanges 153, 163 of the fastening strips 130, 131 are the only separator 172 engaging surfaces of the fastening strips 130, 131. Consequently, the slider 132 need not force itself between the webs 140, 141, 150, 151 of the fastening strips 130, 131.

As an aspect of the present invention, the shoulders 240, 242, 260, 262 prevent removal of the slider 132 from the fastening strips 130, 131 in the vertical Z axis 106 after the slider 132 has been attached to the fastening strips 130, 131. Moreover, the shoulders 240, 242, 260, 262 of the slider 132 provide upper radial or concave surfaces 246, 248, 266, 268 which engage the lower flanges 157, 167 of the fastening strips 130, 131 to retain the proper orientation of the fastening strips 130, 131 within

the slider 132. In the event removal of the slider 132 in the vertical Z axis 106 is attempted, the shoulders 240, 242, 260, 262 will provide resistance against removal of the slider 132. The shoulders 240, 242, 260, 262 retain the slider 132 on the fastening strips 130, 131 by resisting vertical Z axis 106 movement of the fastening strips 130, 131 through the slots 270, 280. Referring to Fig. 10, if the slider 132 was pulled upward in the Z axis 106, the offset 159 engages the offset 169 to prevent the fastening strips from entering the slots 270, 280. In addition, the lower flanges 157, 167 engage the upper radial or concave surfaces 246, 248, 266, 268 to prevent the fastening strips from entering the slots 270, 280. As a result, the slider 132 may only be removed from the fastening strips 130, 131 in the vertical Z axis 106 by either tearing through the fastening strips 130, 131 or breaking and/or by deforming the shoulders 240, 242, 260, 262 of the slider 132.

Fig. 13 illustrates the respective vertical positions of the slider 132 and container 120 immediately prior to attaching the slider 132 onto the fastening strips 130, 131. The container 120 provides a seam 125 at the end of the fastening strips 130, 131. At the seam 125, the fastening strips 130, 131 are melted together which effectively occludes the fastening strips 130, 131. During attachment of the slider onto the fastening strips

in the horizontal X axis 102, the separator 172 of the slider 132 extends below the top of the fastening strips 130, 131 a distance 290. Consequently, the seam 125 of the fastening strips has an opening at least a minimum distance 290 from the top of the fastening strips 130, 131 to permit insertion of the separator 172 between the fastening strips 130, 131 during attachment of the slider 132 onto the fastening strips 130, 131 in the horizontal X axis 102.

Figs. 14-18 sequentially illustrate the attachment of the slider 132 onto the fastening strips 130, 131 in the horizontal X axis 102. Fig. 14 depicts occluded fastening strips 130, 131 and a slider 132 having a flexible occlusion member 210 in a relaxed position. The occluded fastening strips 130, 131 are positioned between the first side portion 174 and the second side portion 176 immediately above the rear slot 280. Referring to Fig. 15, the fastening strips 130, 131 are moved in the horizontal X axis 102 toward the slider 132. The fastening strips 130, 131 engage the legs 214, 216 of the flexible occlusion member 210 and deflect the legs 214, 216 outwardly in the transverse Y axis 104 toward their respective side portions 174, 176 thus permitting passage of the seam 125 and fastening strips 130, 131. The seam 125 has protrusions 291, 292 which are created during the thermal cutting of the seam 125.

As shown in Figs. 16, upon further movement of the fastening strips 130, 131 toward the slider 132 in the horizontal X axis 102, the seam 125 and the fastening strips 130, 131 project through the legs 214, 216 of the flexible occlusion member 210. The legs 214, 216 move toward each other after the seam 125 passes through the legs 214, 216 of the flexible occlusion member 210. The second end 192 of the separator 172 is positioned against the seam 125 of the fastening strips 130, 131 and is properly aligned to fit between the flanges 153, 163 of the fastening strips 130, 131 as seen in Fig. 16A.

As an aspect of the present invention, the flexible occlusion member 210 allows the slider 132 to accommodate fastening strips of different widths and/or varying width. Specifically, the flexible occlusion member can flex to accommodate fastening strips of different widths and/or varying widths, but can also exert sufficient force to occlude the fastening strips.

It will be appreciated by those skilled in the art that the present invention may be embodied in a variety of configurations. The resistance which the flexible occlusion member provides during attachment of the slider onto the fastening strips in the horizontal X axis may be

affected by varying the dimensions and/or material composition of the slider design.

In addition, by properly selecting the slider material, the flexible occlusion member 210 can be relied upon to self adjust with time to the width of the fastening strips. Most plastics will "take a set" (self-adjust with time) to an external stress. Furthermore, due to manufacturing tolerances, the width of the fastening strips may vary along the length, and in addition the width of the slider may vary from one slider to another slider. As an example, if the fastening strips are wide, then the occlusion member 210 will self-adjust or take a set to the wide fastening strips and thereby allow the slider to maintain a low slide force. As another example, if the slider is narrow or tight fitting, then the occlusion member 210 will self-adjust or take a set to the narrow or tight fitting slider and thereby allow the slider to maintain a low slide force. As a further example, the occlusion member 210 will also self-adjust or take a set to narrow fastening strips and/or a wide slider. If the plastic material did not take a set, then wide fastening strips or a tight fitting slider would have a high slide force. Proper selection of material will allow the slider to self adjust to the width of the fastening strips soon after installation and prior to the expected delivery to the consumer.

As seen in Fig. 17, further movement of the fastening strips 130, 131 in the horizontal Z axis 102 forces the separator 172 of the slider 132 between the flanges 153, 163 of the fastening strips 130, 131. Fig. 17A shows the middle of separator 172 positioned between the fastening strips 130, 131 near the seam 125. In accordance with one feature of the invention, Figs. 17A and 18A demonstrate that the fastening strips 130, 131 will have a leak proof seal when the slider 132 is in the end position.

The leak proof seal is created even though the separator 172 extends between flanges 153, 163 of the fastening strips 130, 131. Specifically, the fastening strips 130, 131 are effected not only by the forces acting upon them by the separator 172 at that location but are also by the position of the fastening strips 130, 131 at locations before and after that location. For example, with respect to the position of the fastening strips 130, 131 in Figs. 17A and 18A, the webs 140, 141, 150, 151 are effected by the seam 125 at the end of the fastening strips 130, 131. The seam 125 prevents deocclsuion of the fastening strips by the separator 172.

When the separator 172 is positioned at the locations shown in Figs. 17 and 18 (17A and 18A), the webs 140, 141, 150, 151 of the fastening strips 130, 131 would usually be

deoccluded as shown in Figs. 11-12. When the slider 132 moves to the locations shown in Figs. 15-17, the webs 140, 141, 150, 151 are already occluded and the separating action of the separator 172 is not able to overcome the occlusion effect of the seam 125. Consequently, the fastening strips 130, 131 remain occluded through the length of the fastening strips and establish a leak proof seal when fully occluded.

It will be appreciated by those skilled in the art that a number of different methods may be used to attach sliders to fastening strips in the horizontal X axis. These methods may include manually inserting fastening strips through sliders. Because manual insertion is cumbersome and inefficient from an economic and production standpoint, automated insertion of the fastening strips through the sliders is desirable.

Fig. 19 illustrates an automated rotary system 300 that effectively inserts fastening strips 130, 131 through sliders 132 in the horizontal X axis 102. The rotary system 300 includes a first drum 310 and a second drum 320 which rotate about a single axis. The first drum 310 has a first end 314 and a second end 316 and rotates in a clockwise direction 304 at a first radial speed as viewed in Fig. 19. The perimeter of the first drum 310 provides holes 318 to which a controllable vacuum is connected.

The vacuum holes 318 provide a means for securing the containers 120 to and releasing the containers 120 from the perimeter of the first drum 310 during production. The containers 120 are positioned onto the first drum 310 such that the fastening strips 130, 131 of the containers 120 are disposed along the first end 314 of the first drum 310.

The second drum 320 has a first end 324 and a second end 326 and rotates at a second radial speed also in a clockwise direction 304 as viewed in Fig. 19. The second radial speed is less than the first radial speed. Accordingly, the first drum 310 rotates faster than the second drum 320. The second drum 320 includes a number of axially extending channels 326. Disposed within each channel 326 is a slider retaining cartridge 328.

In operation, a container 120 is placed on the first drum 310 at position 330 or an earlier position. The vacuum of the first drum 310 is used to attach the container 120 to the surface of the first drum. The containers 120 rotate as the first drum 310 rotates and the containers achieve various positions 330, 332, 334, 336, 338 as shown in Fig. 19. The cartridges 328 of the second drum 320 receive sliders 132 at the second end 326 of the second drum 320 at position 340 or an earlier position. The cartridges 328 and sliders 132 rotate as

the second drum 320 rotates and the cartridges 328 achieve various positions 340, 342, 344, 346, 348 as shown in Fig. 19. The cartridges 328 with the sliders 132 move to the first end 324 of the second drum 320 and achieve various positions 340, 342, 344, 346 as shown in Fig. 19. Prior to position 346, the sliders extend beyond the second drum 320 and into the path of the containers 120 on the first drum 310.

The containers 120 attached to the first drum 310 are traveling at a greater radial speed than the sliders 132 and cartridges 328 on the second drum 320. Consequently, each set of fastening strips 130, 131 are inserted within a slider 132 in the horizontal X axis 102 as the fastening strips 130, 131 pass a cartridge 328 and slider 132 as shown in position 346. After the fastening strips 130, 131 are inserted within the slider 132, the slider 132 is disengaged from the cartridge 328 as shown in position 348. The container 120 with the slider 132 then rotates on the first drum 310 to position 346 or a later position and the vacuum retaining the container 120 to the first drum 310 is momentarily turned off to release the container 120 with the slider 132. The vacuum is subsequently turned on to secure another container 120 to the surface of the first drum 310 to repeat the process.

Another embodiment of an automated production system that attaches fastening strips 130, 131 to sliders 132 in the horizontal X axis 102 is illustrated in Figs. 20 and 21. This conveyor system 400 may include any number of conveyors 440, 460 and slider feeders 470. However, for purposes of clarity and convenience, the description will be limited to an upper conveyor 440 and a lower conveyor 460. The conveyor system 400 illustrated in Figs. 20 and 21 includes a drum 410, an upper conveyor 440, a lower conveyor 440 and a slider feeder 470.

The drum 410 rotates in a clockwise direction 404 as viewed in Fig. 21 and supplies containers 120 to the upper conveyor 440 and lower conveyor 460. The perimeter of the drum 410 provides holes 441 to which a controllable vacuum is connected. The vacuum holes 441 provide a means for securing containers 120 to and releasing containers 120 from the perimeter of the drum 410 during production.

The conveyors 440, 460 also provide holes 442 to which a controllable vacuum is connected. The vacuum holes 442 provide a means for securing containers 120 to and releasing containers 120 from the conveyors 440, 460 during production. The containers 120 are positioned onto the conveyors 440, 460 by the drum 410 such that the fastening strips 130, 131 are located on the inside edge of its respective conveyor. The conveyors 440, 460 move

in direction 462 and the containers 120 travel from the first end 464 of the conveyors to the second end 466 of the conveyors.

Slider feeders 470 such as vibrating drum feeders are provided to supply sliders 132 through a channel 476 to the slider holding mechanism 480. The slider holding mechanism 480 is located at the inside edge of each conveyor. As the container 120 with the fastening strips 130, 131 travels along the conveyor 440, 460 and reaches the slider holding mechanism 480, the conveyor 440, 460 moves the fastening strips 130, 131 through the slider 132 in the horizontal X axis 102. After the slider 132 has been inserted on the fastening strips, the slider 132 is released from slider holding mechanism 480. The container 120 with the slider 132 then travels to the second end 466 of the conveyor 440, 460 until the vacuum retaining the container 120 to the conveyor 440, 460 is momentarily turned off to release the container with the slider.

The lower conveyor 460 operates in a similar fashion. The purpose of using upper and lower conveyors 440, 460 is to create space 482 between the containers 120. As the drum 410 rotates, the containers 120 are placed on the conveyors 440, 460 in an alternating fashion. For example, a first container 120 is placed on conveyor 440, a second container 120 is placed on conveyor 460, a third

container 120 is placed on conveyor 440, a fourth container 120 is placed on a conveyor 440 and this alternating sequence continues. Thus, the alternating sequence creates the space 482 between the containers on the conveyors 440, 460.

The present invention also prevents removal of the slider from the fastening strips in the horizontal X axis 102 once the slider has been attached to the fastening strips. Figs. 22-27 illustrate a slider 1132 having a first and second set of retaining jaws 1200, 1210. The first set of retaining jaws 1200 are provided at the first end 1190 of the slider 1132. The second set of retaining jaws 1210 are provided at the second end 1192 of the slider 1132. As most easily seen in Figs. 23-24, the retaining jaws 1200, 1210 extend outward from the top of the slider 1132 and angle inwardly in the transverse Y axis 104 to form a first upper slot 1270 and a second upper slot 1272. When the slider 1132 is attached to the fastening strips 1130, 1131, the retaining jaws 1200, 1210 are positioned above the top of the fastening strips 1130, 1131 as seen in Figs. 22 and 24.

Figs. 22-23 illustrate first and second crimped end stops 1135, 1137 provided at each end of the fastening strips 1130, 1131. The end stops 1135, 1137 include detents 1140 and protrusions 1142 for engagement with the

retaining jaws 1200, 1210. The crimped end stops 1135, 1137 also extend above the top of the fastening strips 1130, 1131 to correspond with the vertical position of the retaining jaws 1200, 1210. Once the slider 1132 is moved a sufficient distance along the fastening strips 1130, 1131 in the horizontal X axis 102, the respective retaining jaws 1200, 1210 engages the corresponding crimped end stop 1135, 1137.

For example, if the slider 1132 is continually moved in the deocclusion direction 116, the second set of retaining jaws 1210 will eventually engage detents 1140 and protrusions 1142 on the crimped end stop 1137 as shown in Figs. 25-26. Specifically, the upper slot 1272 has a width 1280 which is less than the width 1282 of the protrusions 1142 on the end stop 1137. In addition, the width 1280 of the upper slot is equal to or less than the width 1284 of the detents 1140. As the jaws 1210 engage the end stop 1137, the jaws 1210 engage the detents 1140. As the jaws 1210 move forward, the jaws engage the protrusions 1142 and are stopped by the protrusions 1142. The width 1280 of the slot is less than the width 1282 of the protrusions 1142. In addition, the jaws 1210 are not able to deflect to increase the width 1280 of the slot. Thus, the retaining jaws 1210 will resist further movement of the slider 1132 in the horizontal X axis 102 in the deocclusion direction 116. As a result, the slider 1132

may only be removed from the fastening strips 1130, 1131 in the horizontal X axis 102 by either tearing through the end stops or by breaking and/or deforming the retaining jaws 1200, 1210 of the slider 1132.

Fig. 27 illustrates another embodiment of end stops 2135, 2137 that may be used with the retaining jaws 2200, 2210 similar to the embodiment shown in Figs. 22-26. However, the wedge end stops 2135, 2137 of Fig. 27 angle outwardly at the respective ends of the fastening strips 2130, 2131 thereby increasing the width 2284 of the end stop. The retaining jaws 2200, 2210 also utilize the increase in the width 2284 of the end stops 2135, 2137 to engage the retaining jaws 2200, 2210 as well as the protrusions 2142 provided along the outer surface of the wedge stops 2135, 2137. The width 2284 of the wedge end stops 2135, 2137 increases to a width greater than the width 2280 of the upper slots 2270, 2272. Once the retaining jaws 2200, 2210 engage the end stops 2135, 2137, the width 2284 of the end stops and the width 2282 of the protrusions 2142 prevent further horizontal movement of the slider 2132 in the horizontal X axis 102.

In another embodiment, the slider may have a single jaw on the end of the slider to engage the end stop. Since the jaw will not deflect, the slider will stop when the jaw engages the protrusion and/or the increasing width

of the end stop. Furthermore, in an additional embodiment, the slider may have a single jaw on each end of the slider.

Figs. 28-29 illustrate interlocking fastening strips of different configurations and the corresponding slider design. As shown in Fig. 28, the interlocking fastening strips 3130, 3131 may alternatively comprise "arrowhead-type" closure elements which are used with a slider 3132.

Additionally, the interlocking fastening strips 4130, 4131 may comprise "profile" closure elements which are used with a slider 4132, as shown in Fig. 29. These closure elements are described in U.S. Patent 5,664,299.

Although several interlocking fastening strip embodiments have been specifically described and illustrated herein, it will be readily appreciated by those skilled in the art that other kinds, types, or forms of fastening strips may alternatively be used without departing from the scope or spirit of the present invention.

The interlocking fastening strips of the present invention may be manufactured by extrusion through a die. In addition, the fastening strips may be manufactured to have approximately uniform cross-sections. This not only

simplifies the manufacturing of a closure device, but also contributes to the physical flexibility of the closure device.

Generally, the interlocking fastening strips of the present invention may be formed from any suitable thermoplastic material including, for example, polyethylene, polypropylene, nylon, or the like, or from a combination thereof. Thus, resins or mixtures of resins such as high density polyethylene, medium density polyethylene, and low density polyethylene may be employed to prepare the interlocking fastening strips of the present invention. In most instances, the fastening strips are made from low density polyethylene. The selection of the appropriate thermoplastic material, however, is related to the particular design of the fastening strips, the Young's Modulus of the thermoplastic material, and the desired elasticity and flexibility of the strips.

When the fastening strips of the present invention are used in a sealable bag, the fastening strips and the films that form the body of the bag may be conveniently manufactured from heat sealable material. In this way, the bag may be economically formed by using an aforementioned thermoplastic material and by heat sealing the fastening strips to the bag. In most instances, the

bag is made from a mixture of high pressure, low density polyethylene and linear, low density polyethylene.

The fastening strips of the present invention may be manufactured by extrusion or other known methods. For example, the closure device may be manufactured as individual fastening strips for later attachment to the bag or may be manufactured integrally with the bag. In addition, the fastening strips may be manufactured with or without flange portions on one or both of the fastening strips depending upon the intended use of the closure device or expected additional manufacturing operations.

Generally, the closure device of the present invention can be manufactured in a variety of forms to suit the intended use. In practicing the present invention, the closure device may be integrally formed on the opposing side walls of the container or bag, or connected to the container by the use of any of many known methods. For example, a thermoelectric device may be applied to a film in contact with the flange portion of the fastening strips or the thermoelectric device may be applied to a film in contact with the base portion of fastening strips having no flange portion, to cause a transfer of heat through the film to produce melting at the interface of the film and a flange portion or base portion of the fastening strips. Suitable thermoelectric

devices include heated rotary discs, traveling heater bands, resistance-heated slide wires, and the like. The connection between the film and the fastening strips may also be established by the use of hot melt adhesives, hot jets of air to the interface, ultrasonic heating, or other known methods. The bonding of the fastening strips to the film stock may be carried out either before or after the film is U-folded to form the bag. In any event, such bonding is done prior to side sealing the bag at the edges by conventional thermal cutting. In addition, the first and second fastening strips may be positioned on opposite sides of the film. Such an embodiment would be suited for wrapping an object or a collection of objects such as wires. The first and second fastening strips should usually be positioned on the film in a generally parallel relationship with respect to each other, although this will depend on the intended use.

The slider may be multiple parts and snapped together. In addition, the slider may be made from multiple parts and fused or welded together. The slider may also be a one piece construction. The slider can be colored, opaque, translucent or transparent. The slider may be injection molded or made by any other method. The slider may be molded from any suitable plastic material, such as, nylon, polypropylene, polystyrene, acetal, toughened acetal, polyketone, polybutylene terrephthalate,

high density polyethylene, polycarbonate or ABS (acrylonitrile-butadiene-styrene).

In summary, the present invention affords a closure device with interlocking fastening strips, a slider which facilitates the occlusion and deocclusion of the fastening strips, and a method which facilitates attachment of the slider onto the fastening strips in the horizontal X axis. In addition, the closure device prevents the removal of the slider from the fastening strips in the horizontal X axis and in the vertical Z axis.

From the foregoing it will be understood that modifications and variations may be effectuated to the disclosed structures – particularly in light of the foregoing teachings – without departing from the scope or spirit of the present invention. As such, no limitation with respect to the specific embodiments described and illustrated herein is intended or should be inferred. Indeed, the following claims are intended to cover all modifications and variations that fall within the scope and spirit of the present invention. In addition, all references and copending applications cited herein are hereby incorporated by reference in their entireties.

What is claimed is:

1. A continuous process for assembling a slider onto fastening strips comprising the steps of:

providing a first fastening strip,

providing a second fastening strip

providing a slider adapted to be slidably disposed on said fastening strips and facilitating occlusion of said fastening strips when moved towards a first end thereof and facilitating the deocclusion of said fastening strips when moved in the opposite direction, said fastening strips and said slider having a longitudinal X axis and a transverse Y axis, said transverse Y axis being perpendicular to said longitudinal X axis, said fastening strips and said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis, said slider comprising a housing having a separator facilitating the deocclusion of said fastening strips,

urging said slider onto said fastening strips at said first end in said horizontal X axis.

2. The invention as in claim 1 further providing that a length of said first fastening strip is occluded to a corresponding length of said second fastening strip to provide an occluded length, said separator penetrates a portion of said occluded length of said fastening strips.

3. The invention as in claim 1 further providing that said first end is a sealed end.

4. The invention as in claim 1 further providing that said sealed end is a seam.

5. The invention as in claim 3 further providing that said first end has an opening in said sealed end to accommodate the separator.

6. The invention as in claim 4 further providing that said first fastening strip and said second fastening strip are portions of a container, and said step of urging said slider onto said fastening strips is performed when said fastening strips are portions of said container.

7. The invention as in claim 1 further providing said fastening strips are traveling in a path, said slider is positioned in said path of said fastening strips.

8. The invention as in claim 5 further providing that said first fastening strip and said second fastening strip create a leakproof seal at said first end when said fastening strips are occluded.

9. The invention as in claim 1 further providing said slider with a flexible occlusion member.

10. The invention as in claim 1 further providing said slider with a curved shoulder.

11. The invention as in claim 1 further providing said first fastening strip with an offset.

12. The invention as in claim 1 further comprising the step of positioning the fastening strips on a first drum and positioning the slider on a second drum.

13. The invention as in claim 12 further providing that said first drum and said second drum have a common axis.

14. The invention as in claim 12 further providing that said first drum moves the fastening strips faster than said second drum moves the slider.

15. The invention as in claim 12 further providing that said slider is removably attached to said second drum.

16. The invention as in claim 15 further providing said second drum with a slider cartridge to hold said slider.

17. The invention as in claim 16 further providing that said cartridge moves toward said fastening strips.

18. The invention as in claim 17 further providing said fastening strips are traveling in a path, said slider is positioned in the path of said fastenings strips.

19. The invention as in claim 12 further providing said fastening strips are removably attached to said first drum.

20. The invention as in claim 19 further providing a vacuum for holding said fastening strips on said first drum.

21. The invention as in claim 18 further providing said slider is removed from said slider cartridge.

22. The invention as in claim 21 further providing said slider cartridge moves away from said first drum.

23. The invention as in claim 20 further providing said fastening strips are removed from said first drum.

24. The invention as in claim 1 further providing that said fastening strips are positioned on a conveyor.

25. The invention as in claim 24 further providing that said fastening strips are removably attached to the conveyor.

26. The invention as in claim 25 further providing a vacuum for holding said fastening strips on said conveyor.

27. The invention as in claim 24 further providing a holder for holding the slider.

28. The invention as in claim 27 further providing a vibrating feeder to supply the slider to the holder.

29. The invention as in claim 27 further providing that said fastening strips are traveling in a path, said holder positions said slider in the path of said fastening strips.

30. The invention as in claim 29 further providing said slider is removed from said holder.

31. The invention as in claim 25 further providing said fastening strips are removed from said conveyor.

32. An apparatus for a continuous process for assembling a slider onto fastening strips, said slider

adapted to be slidably disposed on said fastening strips and facilitating occlusion of said fastening strips when moved towards a first end thereof and facilitating the deocclusion of said fastening strips when moved in the opposite direction, said fastening strips and said slider having a longitudinal X axis and a transverse Y axis, said transverse Y axis being perpendicular to said longitudinal X axis, said fastening strips and said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis, said slider comprising a housing having a separator facilitating the deocclusion of said fastening strips, said apparatus comprising:

a fastening strip holder which holds a first fastening strip and a second fastening strip,

a slider holder which holds a slider,

the slider holder and the fastening strip holder urge said slider onto said fastening strips at said first end in said horizontal X axis.

33. The invention as in claim 32 wherein a length of said first fastening strip is occluded to a corresponding length of said second fastening strip to provide an occluded length, the slider holder and the fastening strip holder urge the slider onto the fastening strips such that said separator penetrates a portion of said occluded length of said fastening strips.

34. The invention as in claim 32 wherein said first end is a sealed end.

35. The invention as in claim 32 wherein said sealed end is a seam.

36. The invention as in claim 34 wherein said first end has an opening in said sealed end to accommodate the separator.

37. The invention as in claim 35 wherein said first fastening strip and said second fastening strip are portions of a container, and said slider holder urges said slider onto said fastening strips when said fastening strips are portions of said container.

38. The invention as in claim 32 wherein said fastening strip holder is traveling in a path, said slider is positioned in said path of said fastening strips.

39. The invention as in claim 32 wherein the fastening strip holder is a first drum and the slider holder is on a second drum.

40. The invention as in claim 39 wherein said first drum and said second drum have a common axis.

41. The invention as in claim 39 wherein said first drum moves the fastening strips faster than said second drum moves the slider.

42. The invention as in claim 39 wherein said slider is removably attached to said slider holder.

43. The invention as in claim 42 wherein said slider holder is a slider cartridge to hold said slider.

44. The invention as in claim 43 wherein said cartridge moves toward said fastening strips.

45. The invention as in claim 44 wherein said fastening strips are traveling in a path, said slider is positioned in the path of said fastenings strips.

46. The invention as in claim 39 wherein said fastening strips are removably attached to said first drum.

47. The invention as in claim 46 further comprising a vacuum for holding said fastening strips on said first drum.

48. The invention as in claim 45 wherein said slider is removed from said slider cartridge.

49. The invention as in claim 48 wherein said slider cartridge moves away from said first drum.

50. The invention as in claim 47 wherein said fastening strips are removed from said first drum.

51. The invention as in claim 32 wherein said fastening strip holder is a conveyor.

52. The invention as in claim 51 wherein said fastening strips are removably attached to the conveyor.

53. The invention as in claim 52 further comprising a vacuum for holding said fastening strips on said conveyor.

54. The invention as in claim 51 further comprising a vibrating feeder to supply the slider to the slider holder.

55. The invention as in claim 51 wherein said fastening strips are traveling in a path, said slider holder positions said slider in the path of said fastening strips.

56. The invention as in claim 55 wherein said slider is removed from said holder.

57. The invention as in claim 52 wherein said fastening strips are removed from said conveyor.

58. A closure device comprising:

a first fastening strip;

a second fastening strip;

a slider adapted to be slidably disposed on said fastening strips and facilitating the occlusion of said fastening strips when moved towards a first end thereof and facilitating the deocclusion of said fastening strips when moved towards a second end thereof, said fastening strips and said slider having a longitudinal X axis and a transverse Y axis, said transverse Y axis being perpendicular to said longitudinal X axis, said fastening strips and said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis, said slider comprising a housing having a first flexible occlusion member for facilitating occlusion of said fastening strips when said slider is moved to said first end of said fastening strips.

59. The invention as in claim 58, wherein said first flexible portion comprises a first inwardly biased leg for engaging said first fastening strip.

60. The invention as in claim 58 further comprising a second flexible occlusion member for facilitating

occlusion of said fastening strips when said slider is moved to said first end of said fastening strips.

61. The invention as in claim 60, wherein said second flexible occlusion member comprises a second inwardly biased leg for engaging said second fastening strip.

62. The invention as in claim 61 wherein said first flexible occlusion member comprises a first inwardly biased leg for engaging said first fastening strip.

63. The invention as in claim 60 wherein said fastening strips are disposed between said first and second flexible occlusion members.

64. The invention as in claim 58 wherein said first flexible occlusion member has a first position when the first flexible occlusion member engages the first fastening strip and a second position when the first flexible occlusion member is not engaged with the first fastening strip.

65. The invention as in claim 64 wherein the second position is deflected from the first position.

66. The invention as in claim 60 wherein said second flexible occlusion member has a first position when the second flexible occlusion member engages the second fastening strip and a second position when the second flexible occlusion member is not engaged with the second fastening strip.

67. The invention as in claim 66 wherein the second position is deflected from the first position.

68. The invention as in claim 58 wherein said first flexible occlusion member flexes for facilitating the attachment of said slider onto said fastening strips in said horizontal X axis.

69. The invention as in claim 60 wherein said second flexible occlusion member flexes for facilitating the attachment of said slider onto said fastening strips in said horizontal X axis.

70. The invention as in claim 58 wherein said fastening strips have a first width and a second width, said first flexible occlusion member has a first position for the first width and a second position for the second width.

71. The invention as in claim 70 wherein said first flexible occlusion member will take a set to the first position.

72. The invention as in claim 70 wherein said first flexible occlusion member will take a set to the second position.

73. The invention as in claim 58 wherein said fastening strips have a first width, said slider can be used with a second set of fastening strips having a second width, said first flexible occlusion member has a first position for the first width and a second position for the second width.

74. The invention as in claim 73 wherein said first flexible occlusion member will take a set to the first position.

75. The invention as in claim 73 wherein said first flexible occlusion member will take a set to the second position.

76. The invention as in claim 58 wherein said fastening strips comprise U-channel type fastening strips.

77. The invention as in claim 58 wherein said fastening strips comprise arrowhead type fastening strips.

78. The invention as in claim 58 wherein said fastening strips comprise profile type fastening strips.

79. A slider adapted to be slidably disposed on first and second fastening strips, said slider facilitating the occlusion of said fastening strips when moved towards said first end thereof and facilitating the deocclusion of said fastening strips when moved towards said second end thereof, said slider comprising:

a longitudinal X axis and a transverse Y axis, said transverse Y axis being perpendicular to said longitudinal X axis, said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis;

a housing having a first flexible occlusion member for facilitating occlusion of said fastening strips when said slider is moved to said first end of said fastening strips.

80. The invention as in claim 79, wherein said first flexible portion comprises a first inwardly biased leg for engaging said first fastening strip.

81. The invention as in claim 79 further comprising a second flexible occlusion member for facilitating

occlusion of said fastening strips when said slider is moved to said first end of said fastening strips.

82. The invention as in claim 81, wherein said second flexible occlusion member comprises a second inwardly biased leg for engaging said second fastening strip.

83. The invention as in claim 82 wherein said first flexible occlusion member comprises a first inwardly biased leg for engaging said first fastening strip.

84. The invention as in claim 81 wherein said fastening strips are disposed between said first and second flexible occlusion members.

85. The invention as in claim 79 wherein said first flexible occlusion member has a first position when the first flexible occlusion member engages the first fastening strip and a second position when the first flexible occlusion member is not engaged with the first fastening strip.

86. The invention as in claim 85 wherein the second position is deflected from the first position.

87. The invention as in claim 81 wherein said second flexible occlusion member has a first position when the second flexible occlusion member engages the second fastening strip and a second position when the second flexible occlusion member is not engaged with the second fastening strip.

88. The invention as in claim 87 wherein the second position is deflected from the first position.

89. The invention as in claim 79 wherein said first flexible occlusion member flexes for facilitating the attachment of said slider onto said fastening strips in said horizontal X axis.

90. The invention as in claim 81 wherein said second flexible occlusion member flexes for facilitating the attachment of said slider onto said fastening strips in said horizontal X axis.

91. The invention as in claim 79 wherein said fastening strips have a first width and a second width, said first flexible occlusion member has a first position for the first width and a second position for the second width.

92. The invention as in claim 91 wherein said first flexible occlusion member will take a set to the first position.

93. The invention as in claim 91 wherein said first flexible occlusion member will take a set to the second position.

94. The invention as in claim 79 wherein said fastening strips have a first width, said slider can be used with a second set of fastening strips having a second width, said first flexible occlusion member has a first position for the first width and a second position for the second width.

95. The invention as in claim 94 wherein said first flexible occlusion member will take a set to the first position.

96. The invention as in claim 94 wherein said first flexible occlusion member will take a set to the second position.

97. A container comprising:

first and second side walls, said first and second side walls including mating first and second fastening strips respectively, said first and second fastening strips comprising a closure device arranged to be interlocked over a predetermined length,

a slider adapted to be slidably disposed on said fastening strips and facilitating the occlusion of said fastening strips when moved towards a first end thereof and facilitating the deocclusion of said fastening strips when moved towards a second end thereof, said fastening strips and said slider having a longitudinal X axis and a transverse Y axis, said transverse Y axis being perpendicular to said longitudinal X axis, said fastening strips and said slider having a vertical Z axis, said vertical Z axis being perpendicular to said longitudinal X axis, said vertical Z axis being perpendicular to said transverse Y axis, said slider comprising a housing having a first flexible occlusion member for facilitating occlusion of said fastening strips when said slider is moved to said first end of said fastening strips.

98. The invention as in claim 97, wherein said first flexible portion comprises a first inwardly biased leg for engaging said first fastening strip.

99. The invention as in claim 97 further comprising a second flexible occlusion member for facilitating occlusion of said fastening strips when said slider is moved to said first end of said fastening strips.

100. The invention as in claim 99, wherein said second flexible occlusion member comprises a second inwardly biased leg for engaging said second fastening strip.

101. The invention as in claim 100 wherein said first flexible occlusion member comprises a first inwardly biased leg for engaging said first fastening strip.

102. The invention as in claim 99 wherein said fastening strips are disposed between said first and second flexible occlusion members.

103. The invention as in claim 97 wherein said first flexible occlusion member has a first position when the first flexible occlusion member engages the first fastening strip and a second position when the first flexible occlusion member is not engaged with the first fastening strip.

104. The invention as in claim 103 wherein the second position is deflected from the first position.

105. The invention as in claim 99 wherein said second flexible occlusion member has a first position when the second flexible occlusion member engages the second fastening strip and a second position when the second flexible occlusion member is not engaged with the second fastening strip.

106. The invention as in claim 105 wherein the second position is deflected from the first position.

107. The invention as in claim 97 wherein said first flexible occlusion member flexes for facilitating the

attachment of said slider onto said fastening strips in said horizontal X axis.

108. The invention as in claim 99 wherein said second flexible occlusion member flexes for facilitating the attachment of said slider onto said fastening strips in said horizontal X axis.

109. The invention as in claim 97 wherein said fastening strips have a first width and a second width, said first flexible occlusion member has a first position for the first width and a second position for the second width.

110. The invention as in claim 109 wherein said first flexible occlusion member will take a set to the first position.

111. The invention as in claim 109 wherein said first flexible occlusion member will take a set to the second position.

112. The invention as in claim 97 wherein said fastening strips have a first width, said slider can be used with a second set of fastening strips having a second width, said first flexible occlusion member has a first position for the first width and a second position for the second width.

113. The invention as in claim 112 wherein said first flexible occlusion member will take a set to the first position.

114. The invention as in claim 112 wherein said first flexible occlusion member will take a set to the second position.

115. The invention as in claim 97 wherein said fastening strips comprise U-channel type fastening strips.

116. The invention as in claim 97 wherein said fastening strips comprise arrowhead type fastening strips.

117. The invention as in claim 97 wherein said fastening strips comprise profile type fastening strips.

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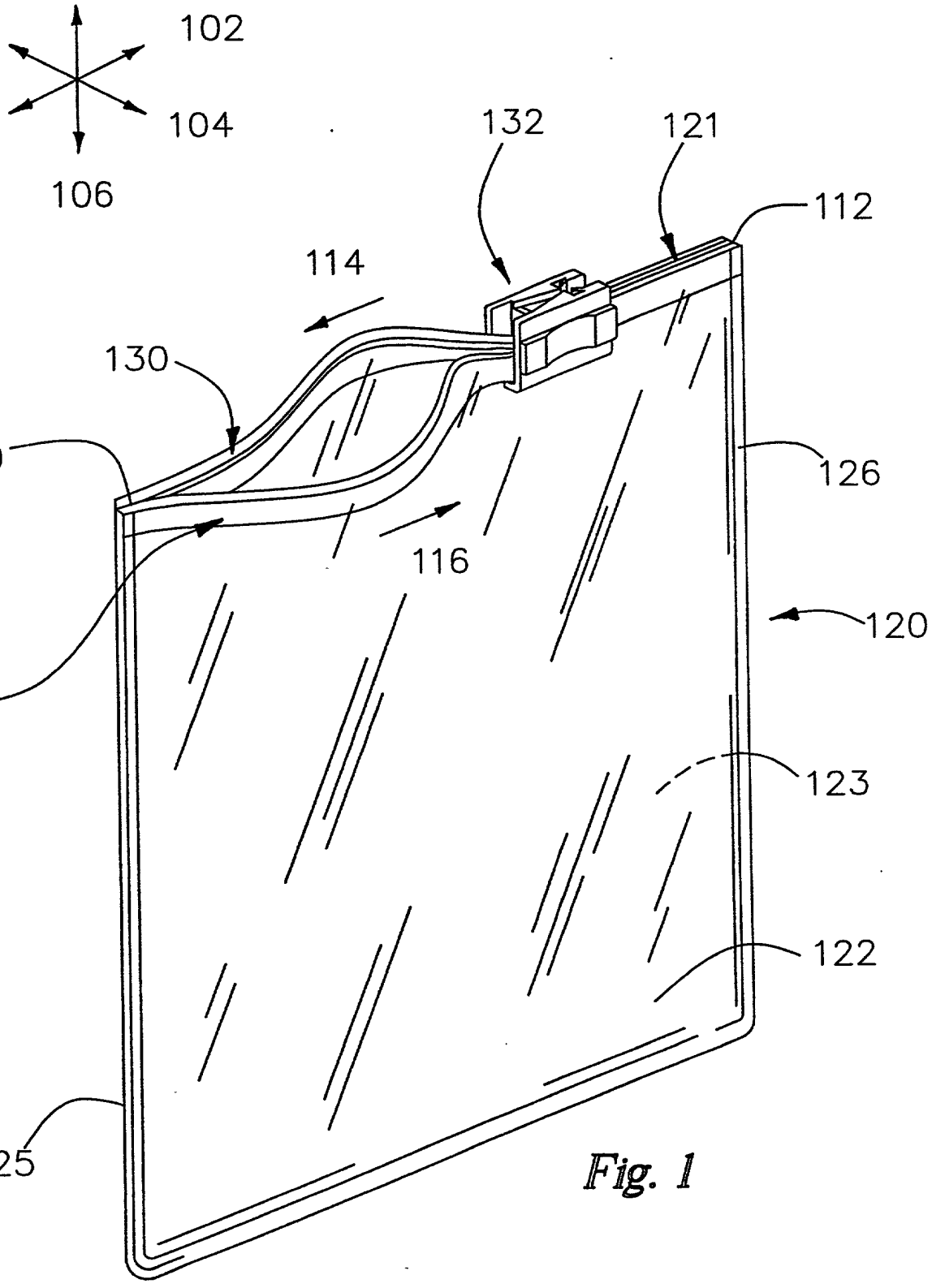


Fig. 1

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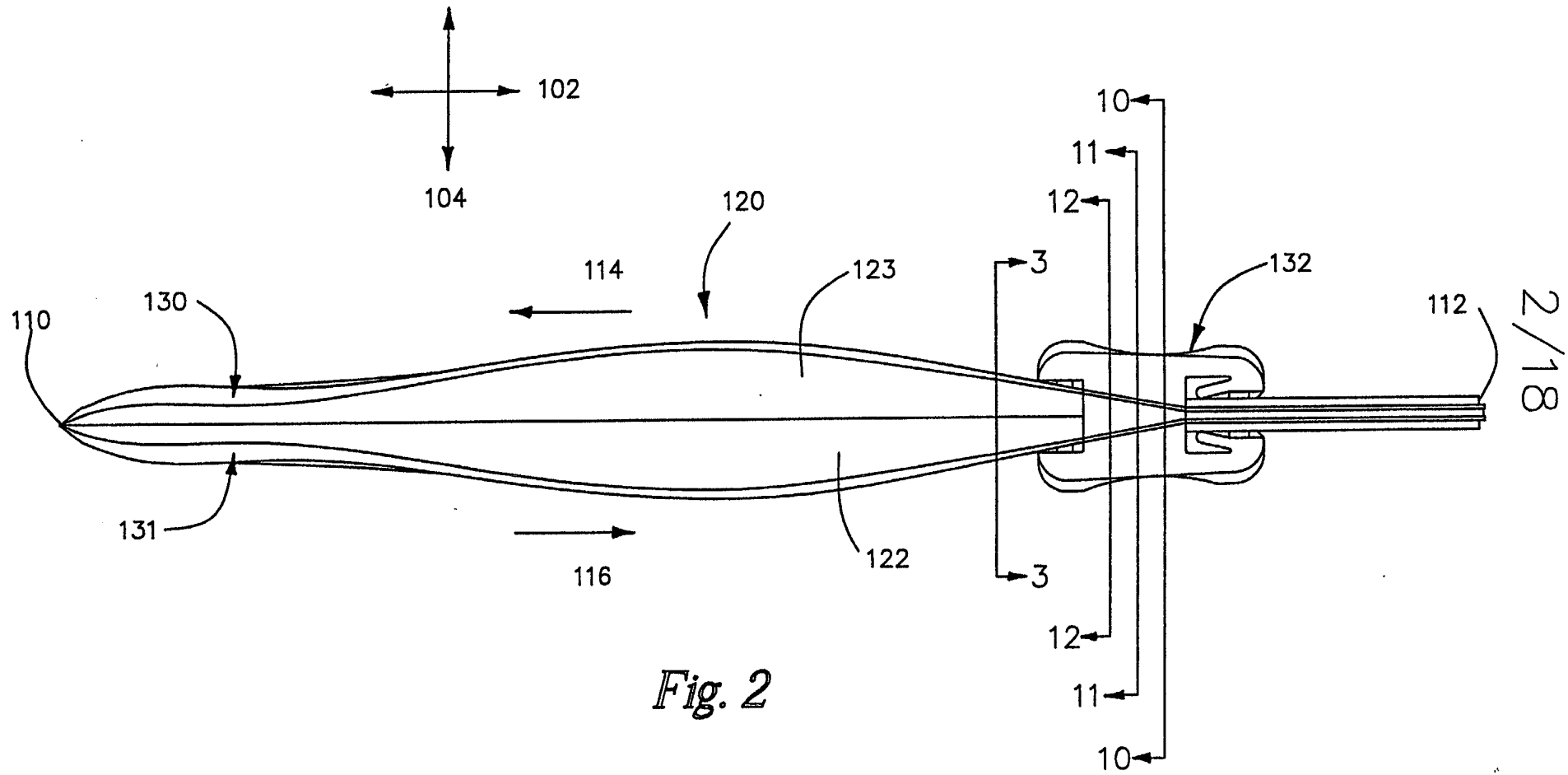


Fig. 2

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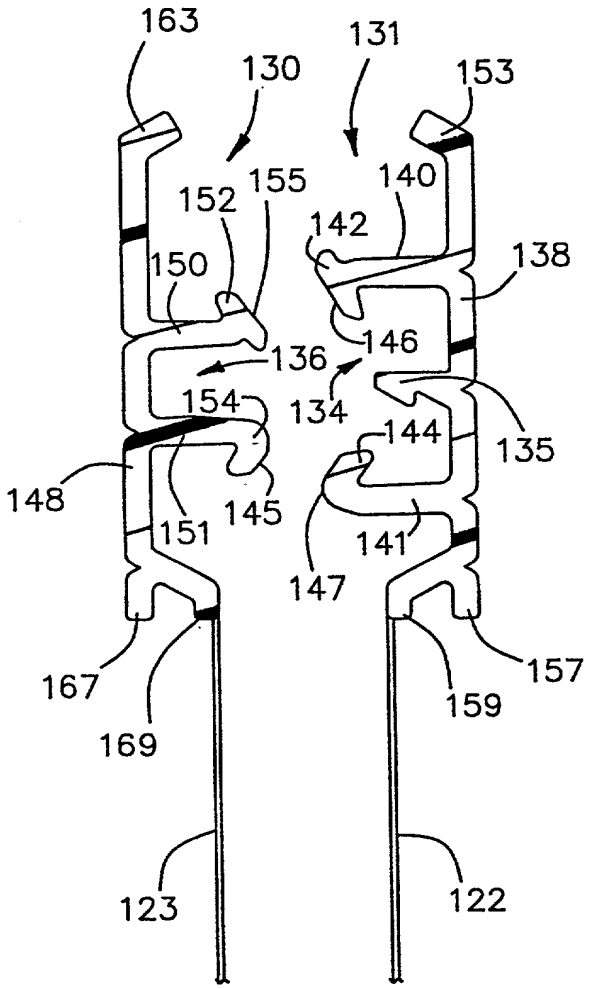

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Fig. 3

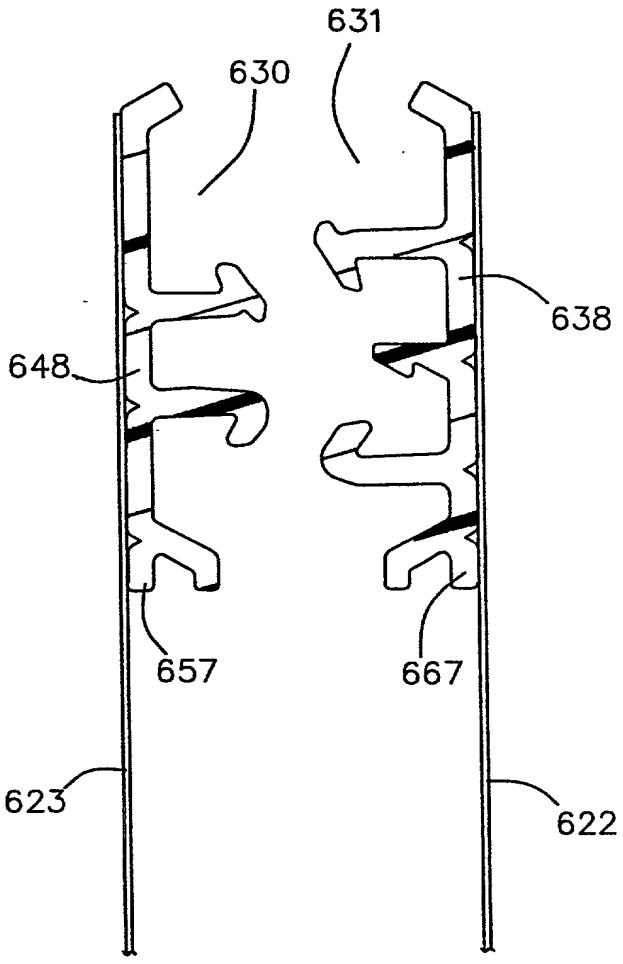

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Fig. 4

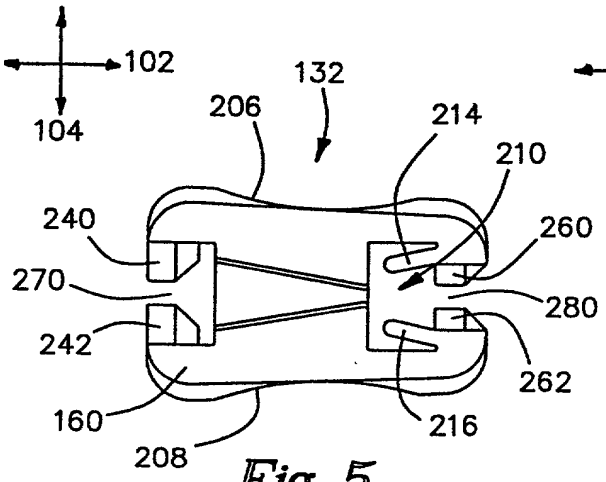


Fig. 5

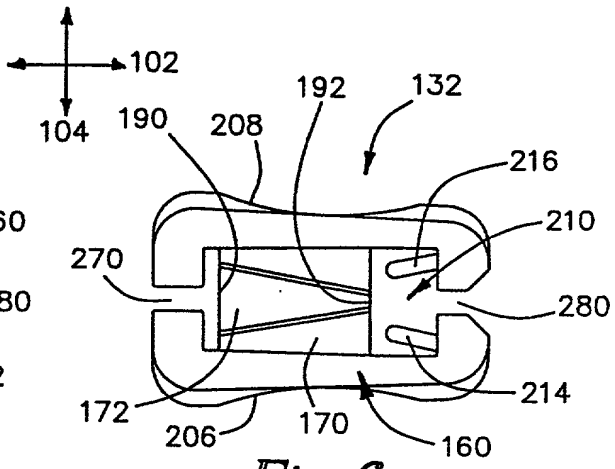


Fig. 6

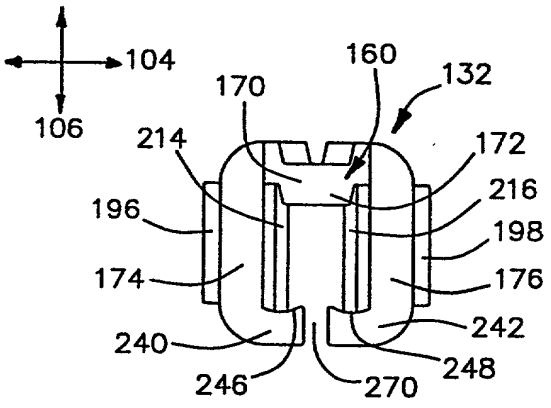


Fig. 7

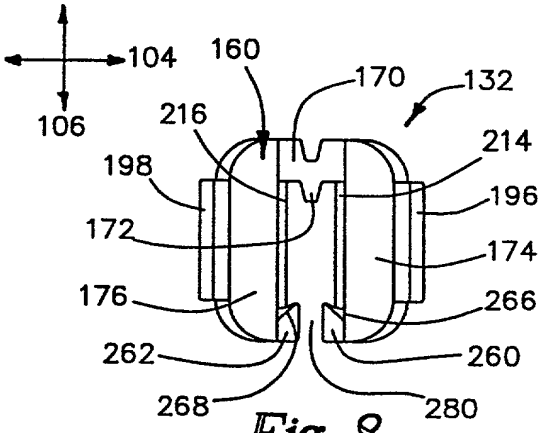


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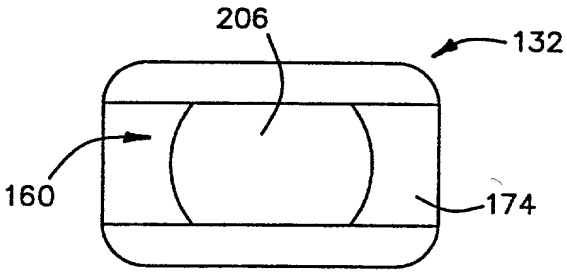


Fig. 9

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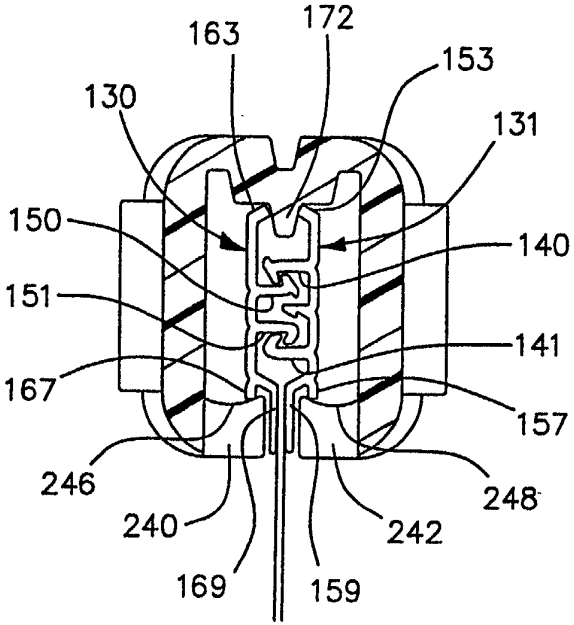


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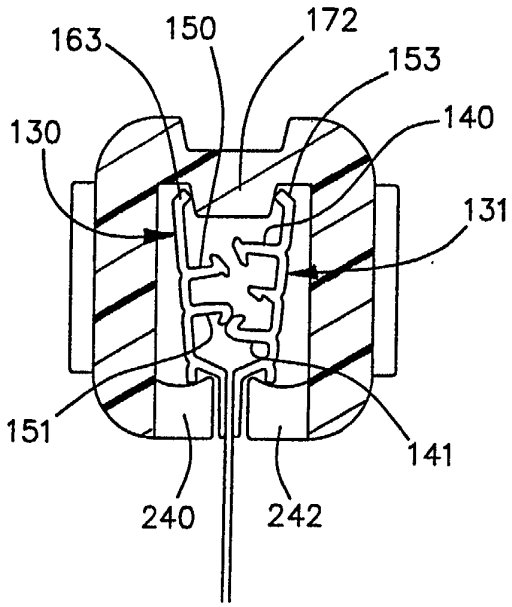


Fig. 11

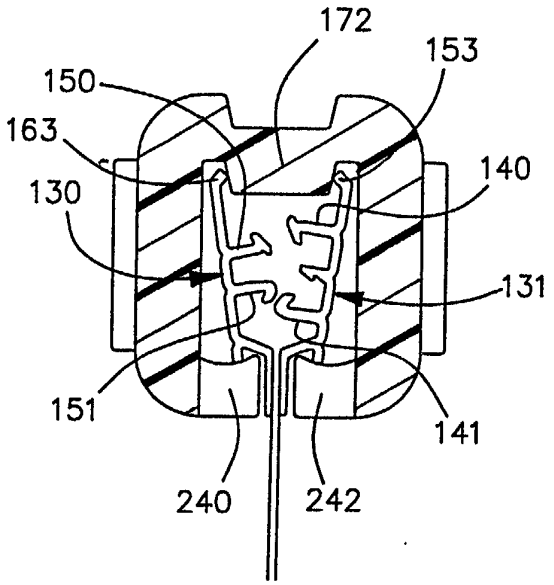


Fig. 12

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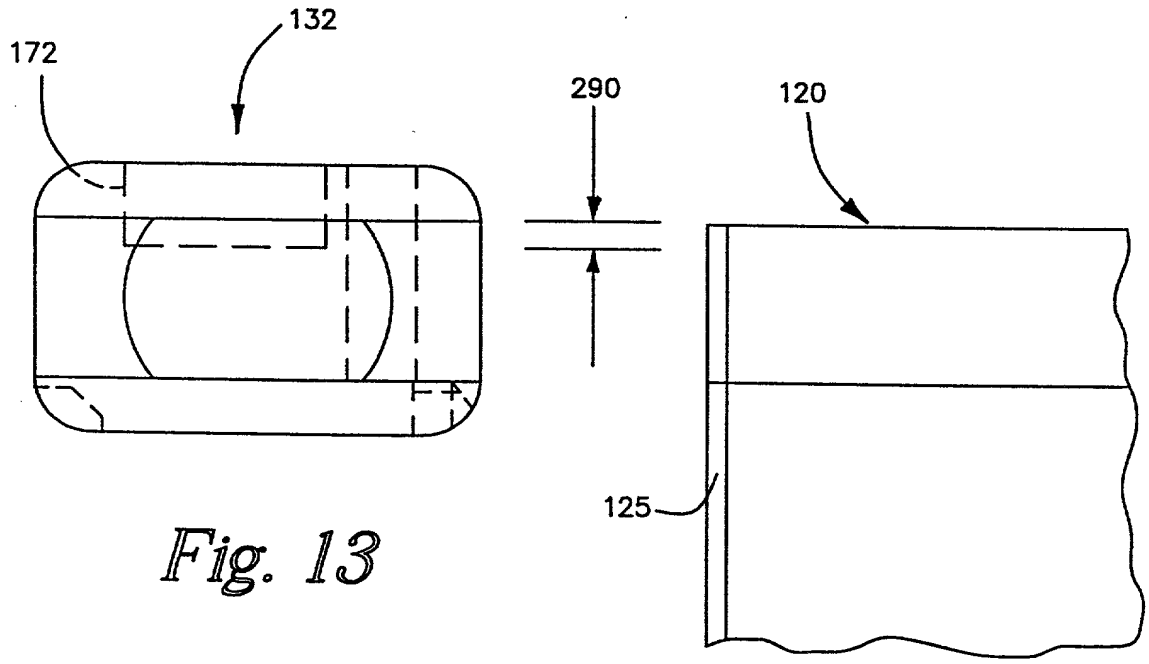


Fig. 13

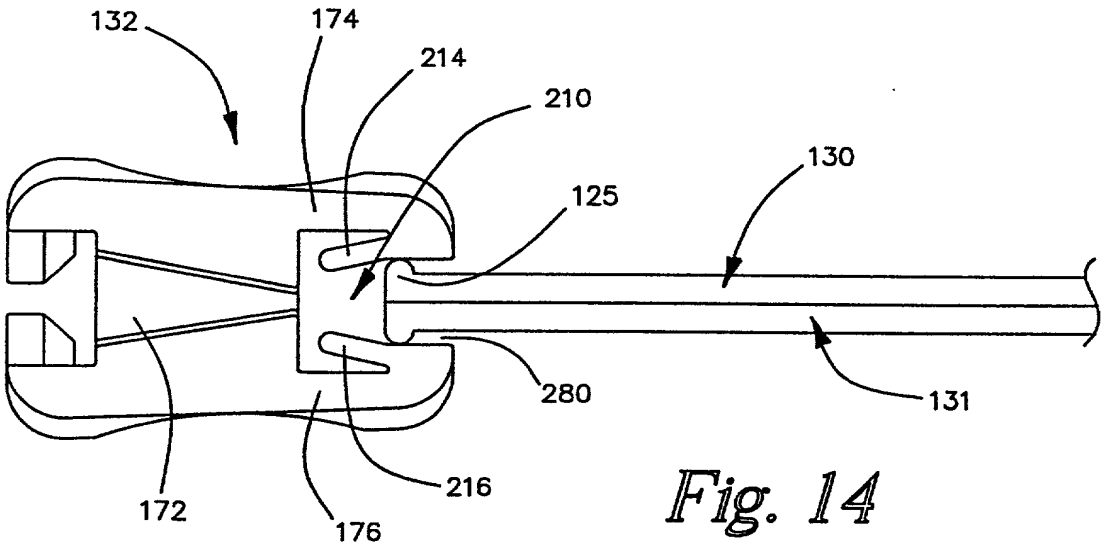


Fig. 14

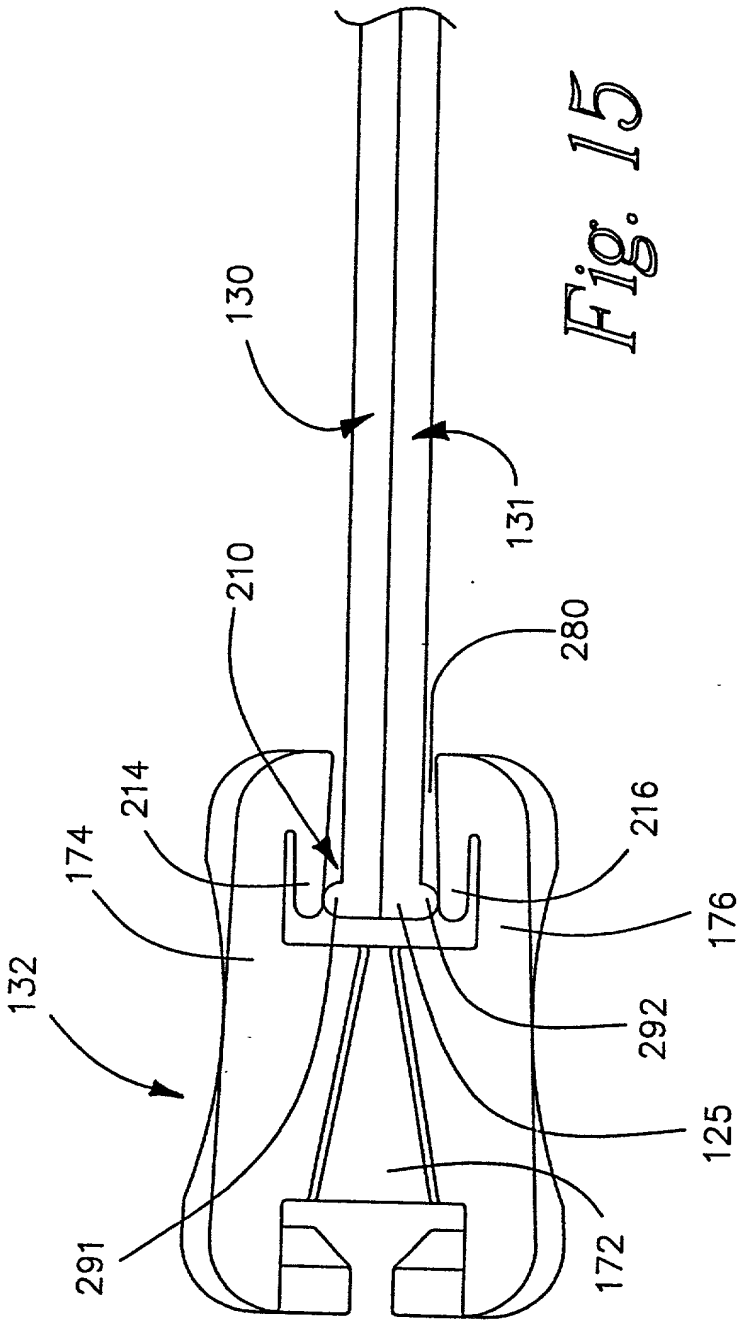


Fig. 15

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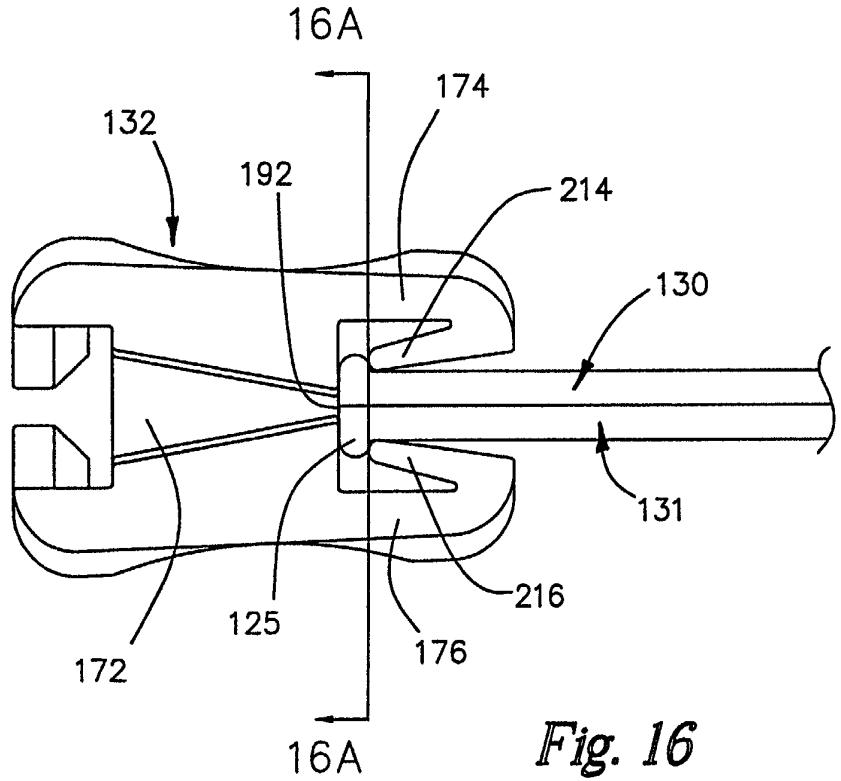


Fig. 16

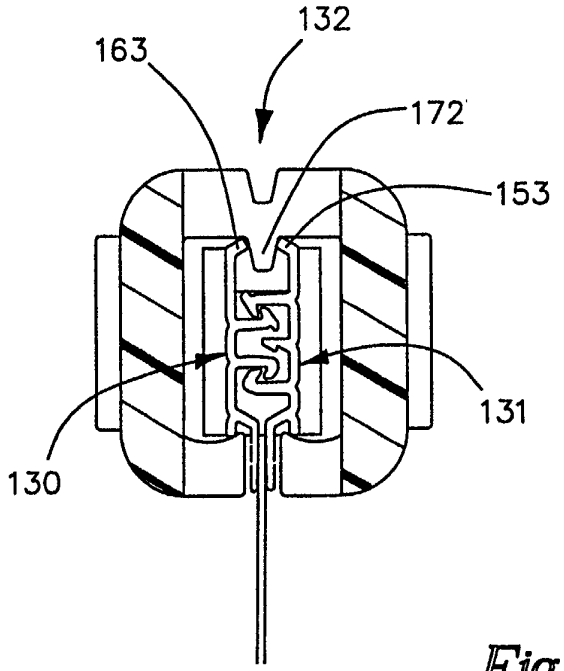


Fig. 16A

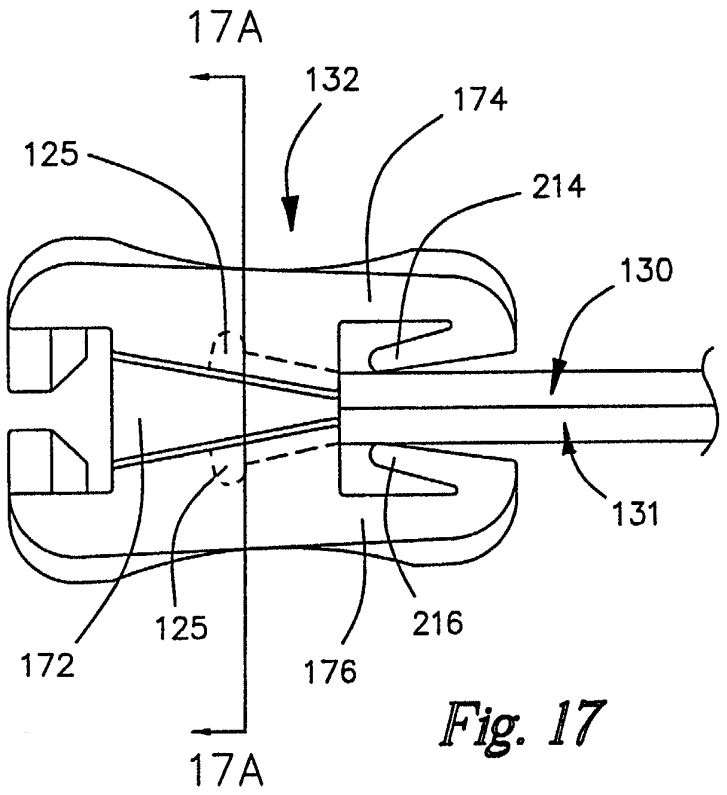


Fig. 17

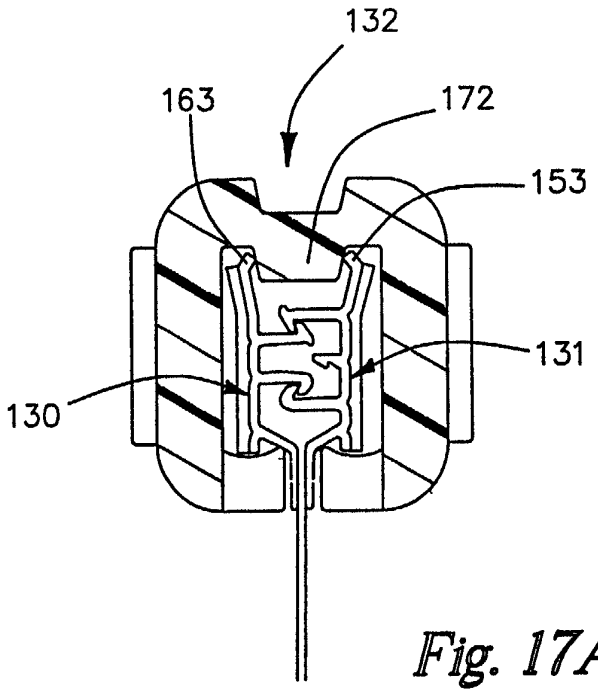


Fig. 17A

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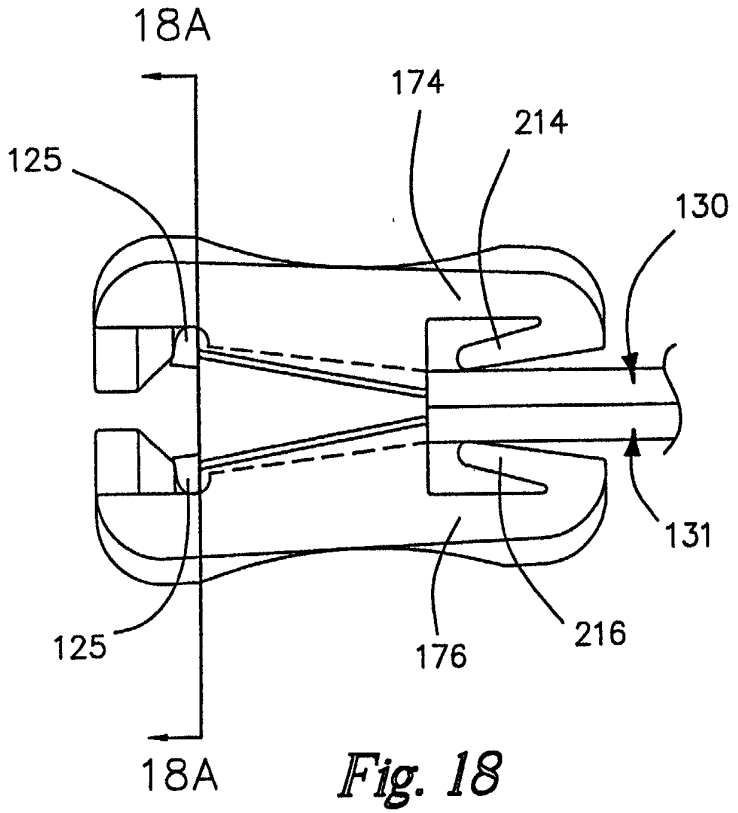


Fig. 18

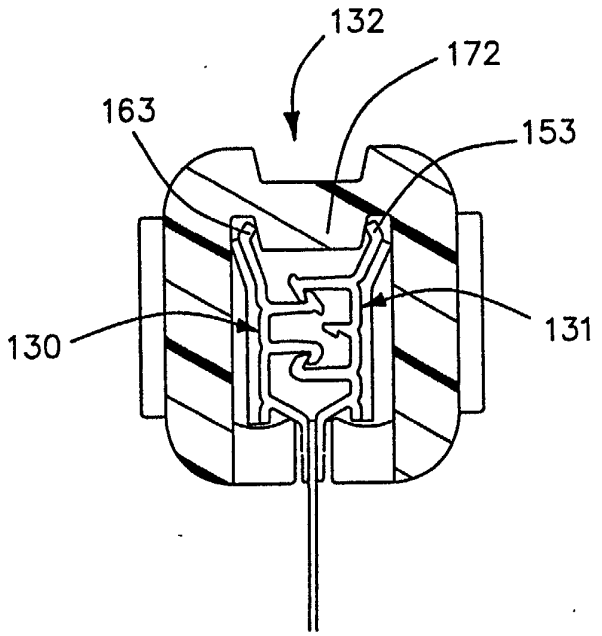


Fig. 18A

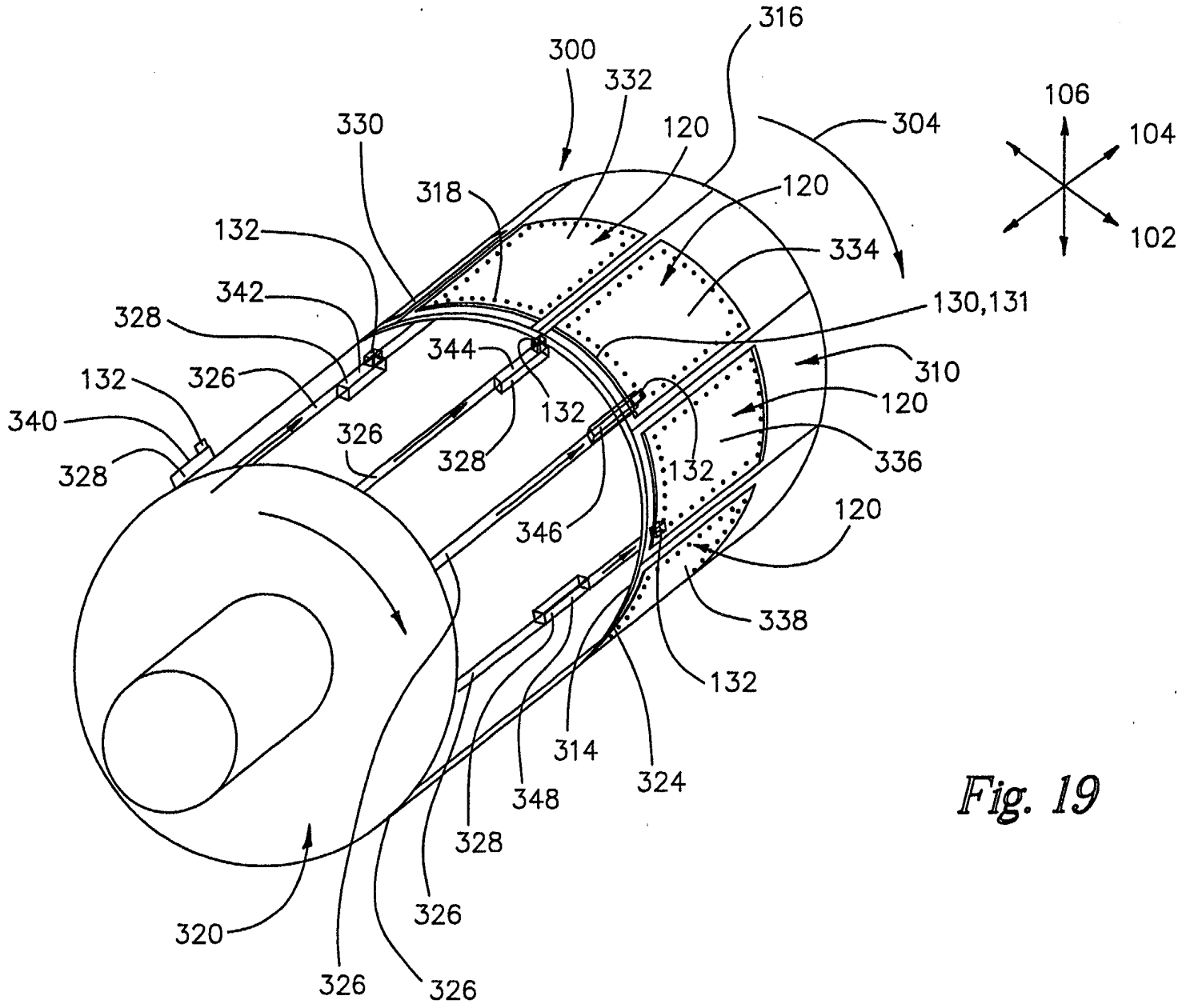

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Fig. 19

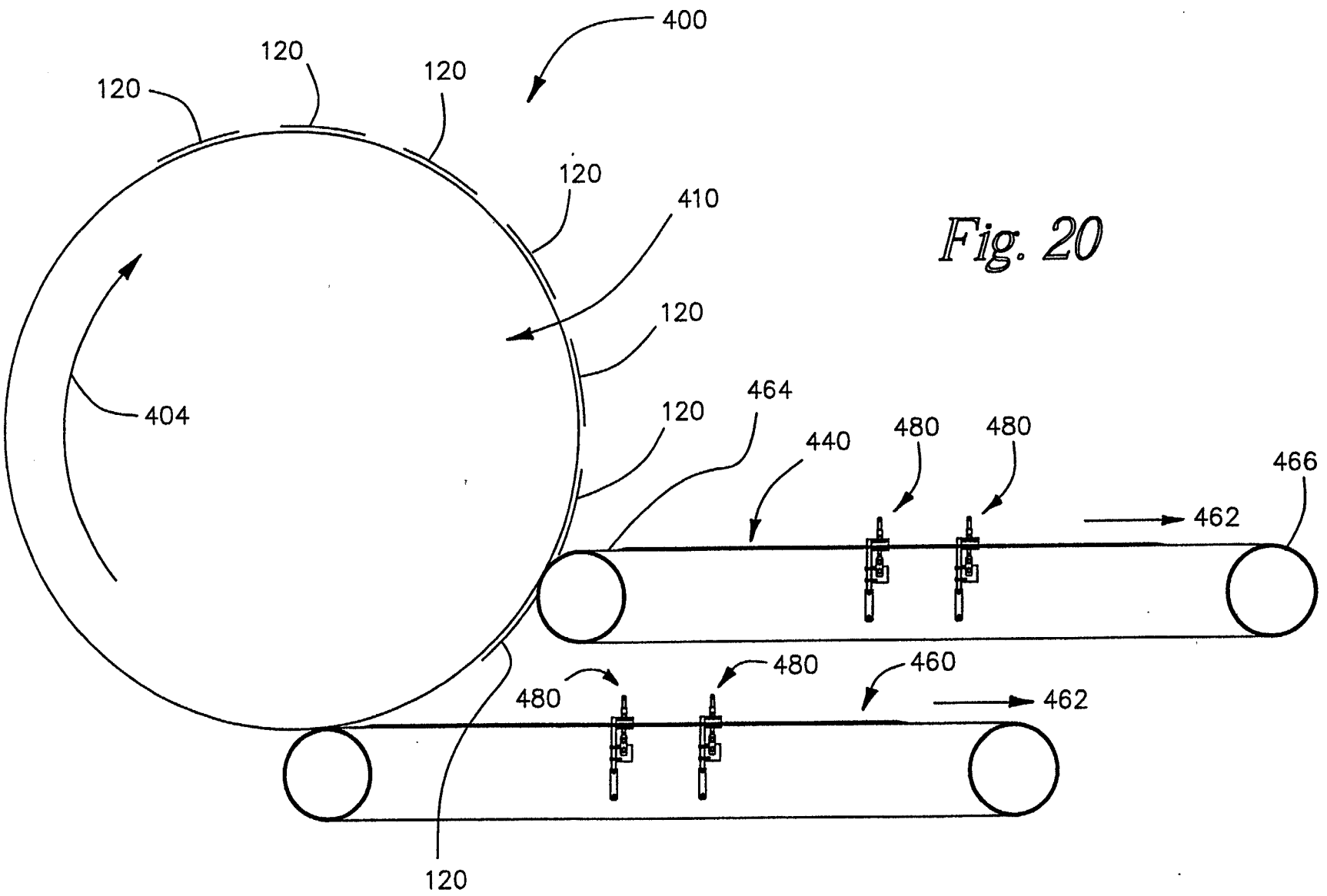

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Fig. 20

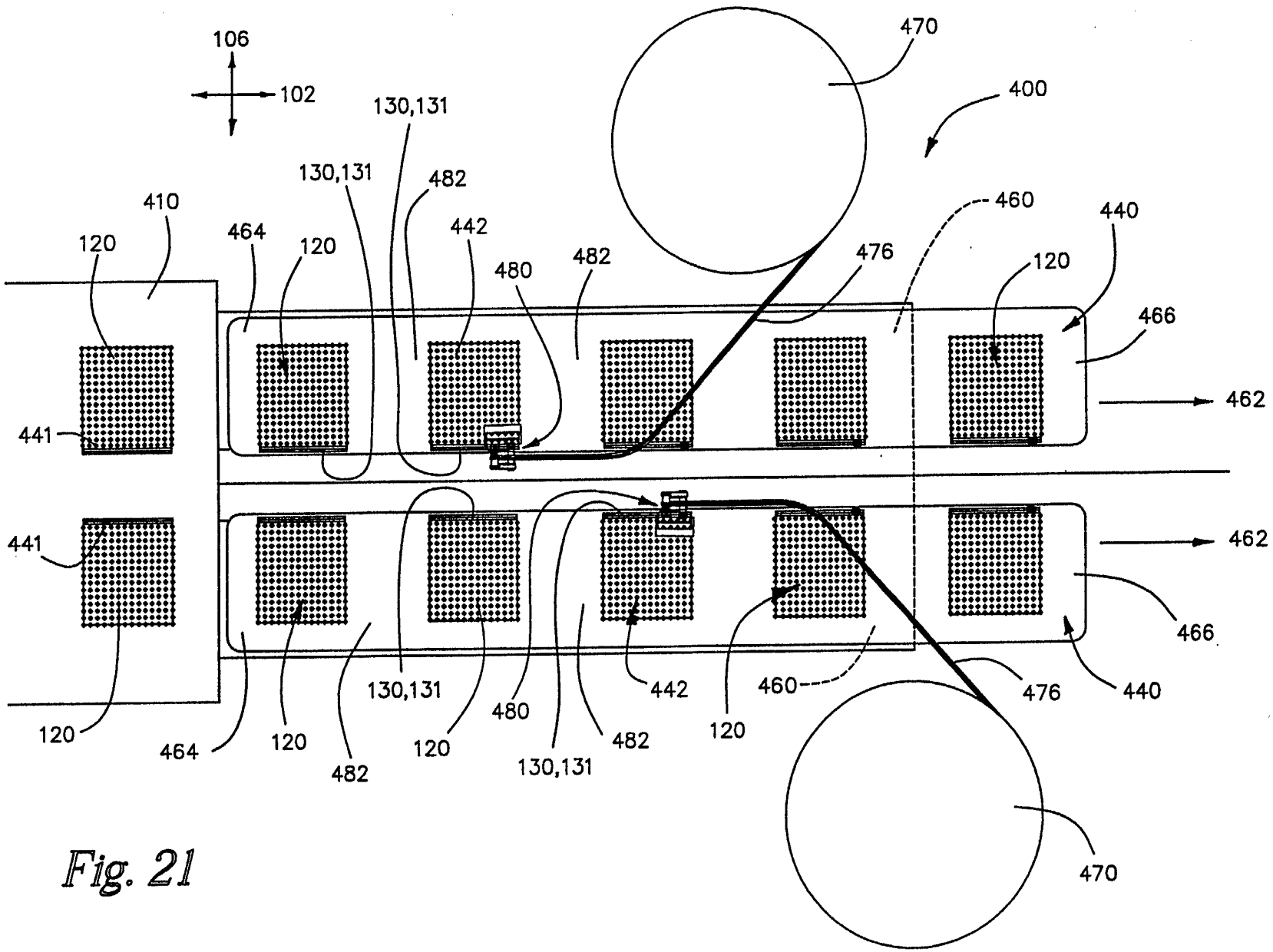


Fig. 21

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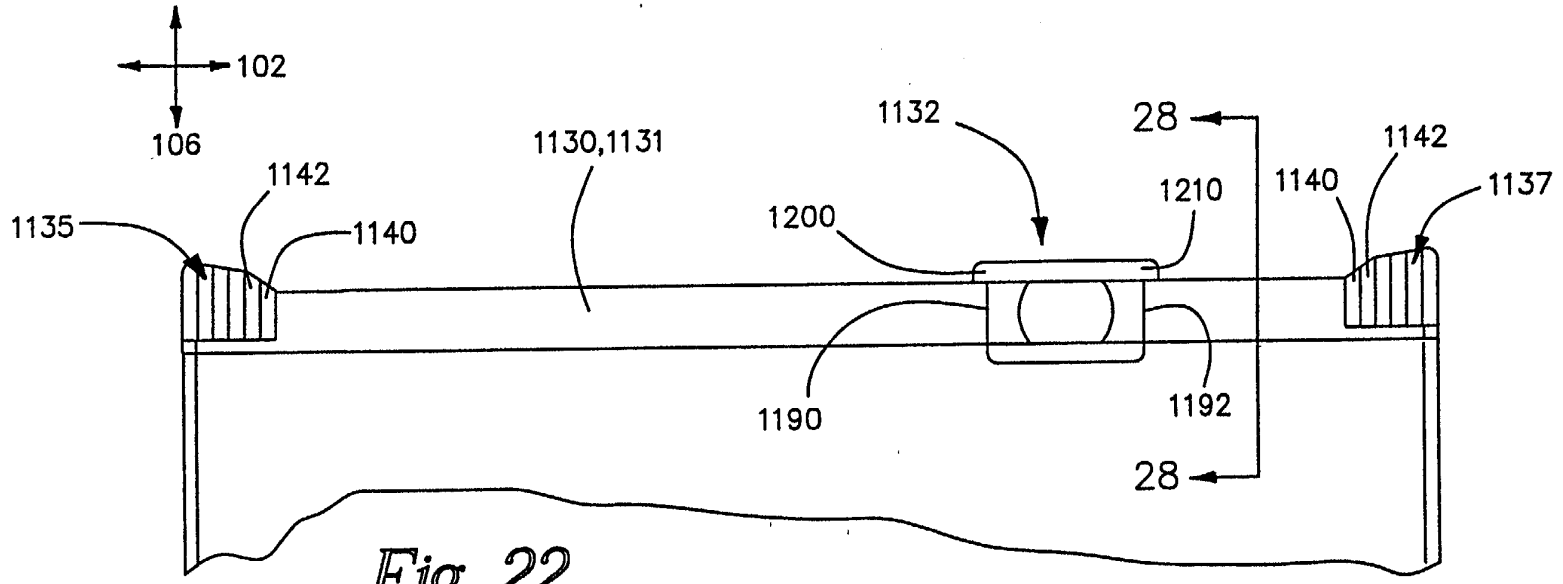


Fig. 22

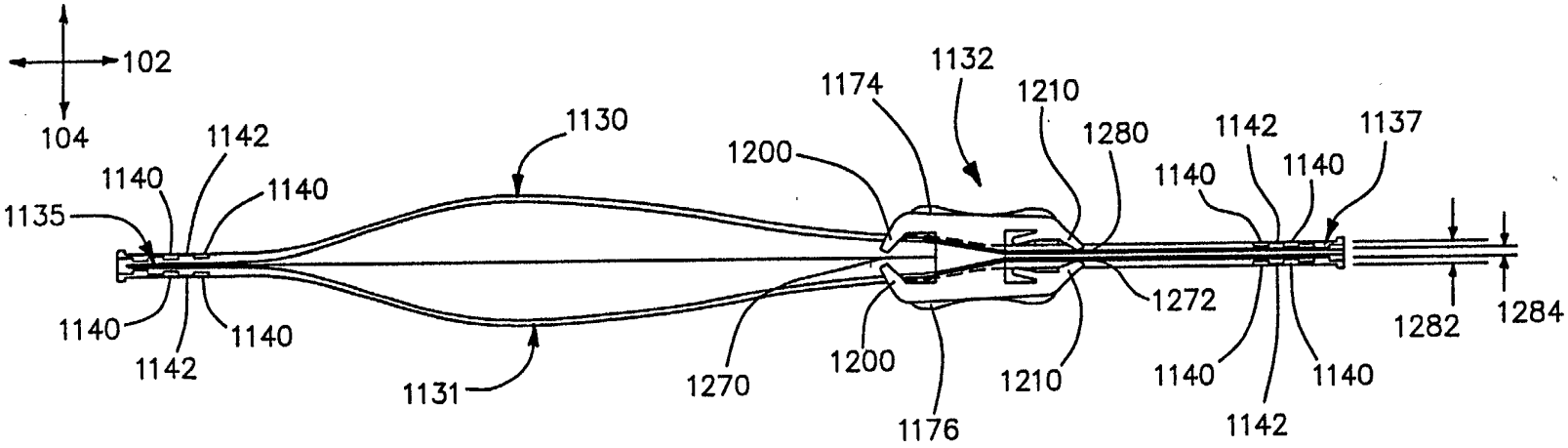


Fig. 23

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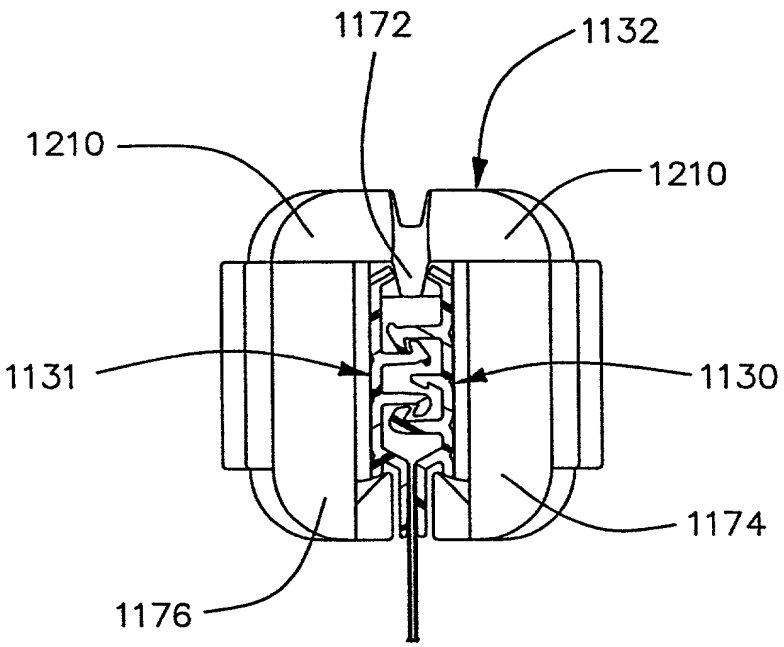


Fig. 24

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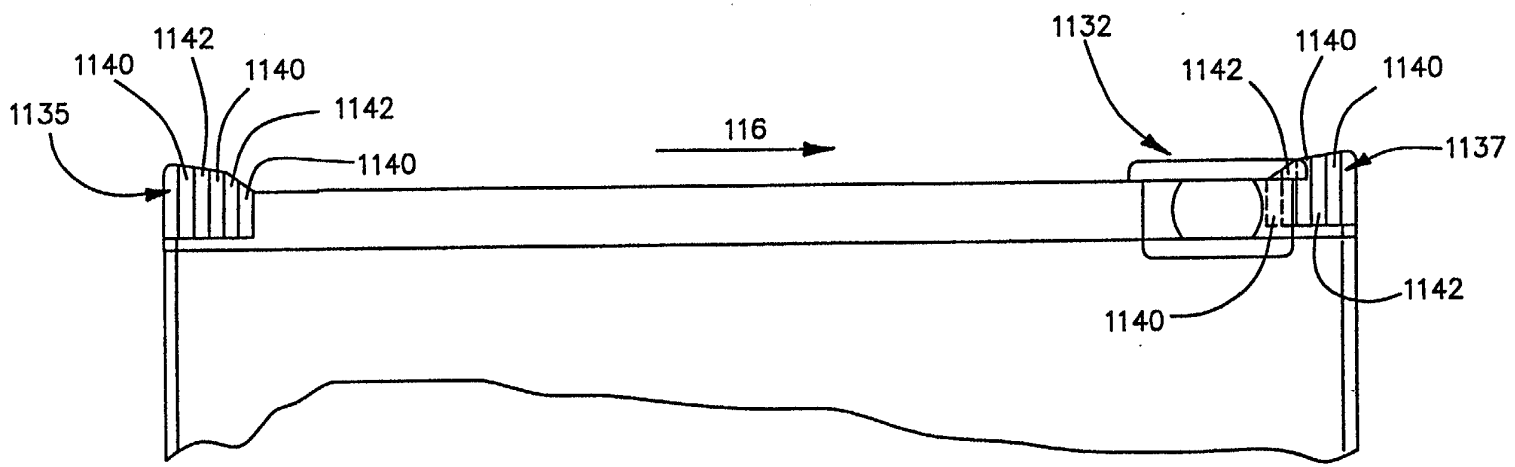


Fig. 25

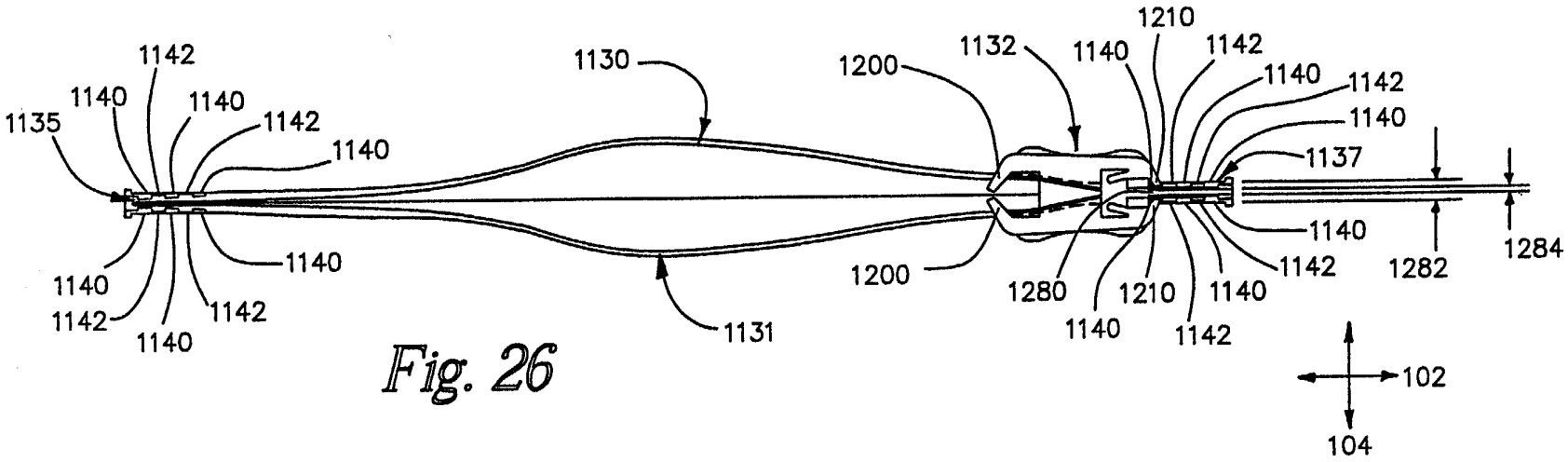


Fig. 26

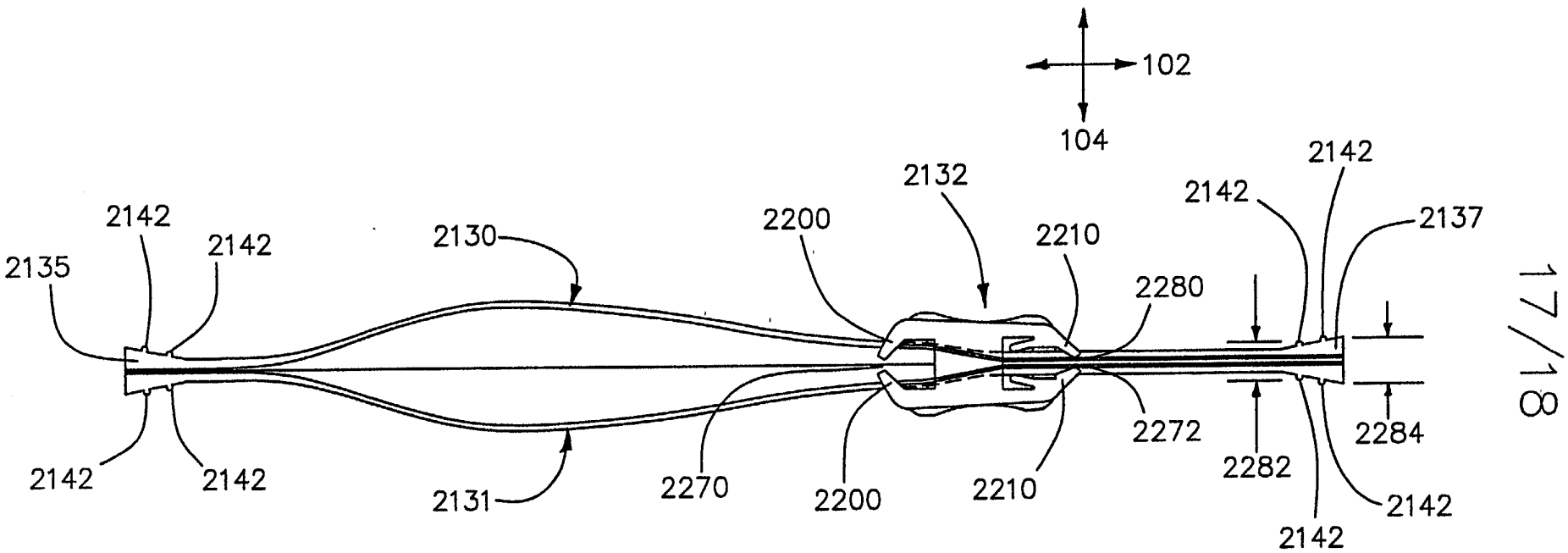


Fig. 27

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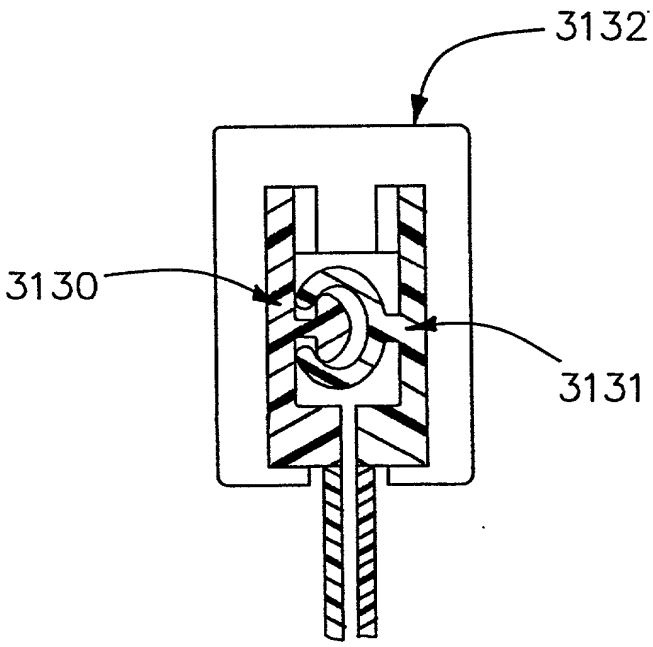


Fig. 28

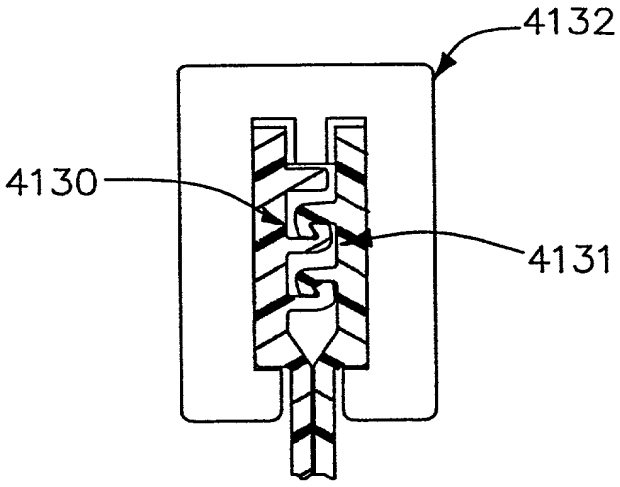


Fig. 29

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL, CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is for a national stage of PCT application.

INVENTORSHIP IDENTIFICATION

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am an original, first and joint inventor of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

CLOSURE DEVICE AND METHOD OF ASSEMBLY

SPECIFICATION IDENTIFICATION

The specification was described and claimed in PCT International Application No. PCT/US99/13091 filed on June 10, 1999.

SUPPLEMENTAL DECLARATION (37 C.F.R. SECTION 1.67(b))

I hereby declare that the subject matter of the attached amendment was part of my/our invention and was invented before the filing date of the original application, above identified, for such invention.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, Section 1.56, and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 C.F.R. Section 1.98.

ALL FOREIGN APPLICATION(S), *IF ANY,* FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

PCT/US99/13091

CLAIM FOR BENEFIT OF EARLIER U.S./PCT APPLICATION(S) UNDER 35 U.S.C. SECTION 120

I hereby claim the benefit, under Title 35, United States Code, Section 120, of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose information that occured between the filing date of the prior application(s) and the national or PCT international filing date of this application.

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. SECTION 120:

U.S. APPLICATIONS — Status

U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
PCT APPLICATION DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. APPLICATION NOS. ASSIGNED (IF ANY)		
PCT/US99/13091	10 JUN 99			

POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

APPOINTED PRACTITIONER(S)	REGISTRATION NUMBER(S)
Thomas C. Feix	34,592
Stephen M. Westbrook	26,050
Joel J. Hayashida	30,765
Mazza J. Mazza	30,775

I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

SEND CORRESPONDENCE TO

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P.O. Box 24305
Oakland, CA 94623-1305

Customer Number 27023

DIRECT TELEPHONE CALLS TO:

Thomas C. Feix
510-271-7416

Page 3 of 5

DECLARATION

I hereby declare that all statements made herein of my own knowledge are tue and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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John C. Ware
Inventor's Signature _____
Date _____ **Country of Citizenship** US
Resident Acworth, Georgia
Post Office Address 105 Sundown Way, Acworth, Georgia 30102

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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2-20
John C. Ware
Inventor's Signature John C. Ware
Date November 13, 2001 **Country of Citizenship** US
Resident Acworth, Georgia GA
Post Office Address 105 Sundown Way, Acworth, Georgia 30102